

Rosemount 2051 Pressure Transmitter

with FOUNDATION™ Fieldbus Protocol



ROSEMOUNT®

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EMERSON™
Process Management

Rosemount 2051 Pressure Transmitter with FOUNDATION Fieldbus

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contacts are listed below:

Customer Central

Technical support, quoting, and order-related questions.

United States - 1-800-999-9307 (7:00 am to 7:00 pm CST)

Asia Pacific- 65 777 8211

Europe/ Middle East/ Africa - 49 (8153) 9390

North American Response Center

Equipment service needs.

1-800-654-7768 (24 hours—includes Canada)

Outside of these areas, contact your local Emerson Process Management representative.

⚠ CAUTION

The products described in this document are NOT designed for nuclear-qualified applications. Using non-nuclear qualified products in applications that require nuclear-qualified hardware or products may cause inaccurate readings.

For information on Rosemount nuclear-qualified products, contact your local Emerson Process Management Sales Representative.

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Section 1 Introduction

USING THIS MANUAL

The sections in this manual provide information on installing, operating, and maintaining Rosemount 2051 pressure transmitters with FOUNDATION fieldbus. The sections are organized as follows:

- **Section 2: Installation** contains mechanical and electrical installation instructions.
- **Section 3: Configuration** provides instruction on basic operation, software functionality, and basic configuration procedures.
- **Section 4: Operation and Maintenance** contains operation and maintenance techniques.
- **Section 5: Troubleshooting** contains information on the troubleshooting suggestions for the most common operating problems. Also included are disassembly and reassembly procedures.
- **Section A: Reference Data** supplies reference and specification data, as well as ordering information.
- **Section B: Approval Information** contains intrinsic safety approval information, European ATEX directive information, and approval drawings.
- **Section C: Block Information** contains information on the Transducer and Resource blocks.

SERVICE SUPPORT

To expedite the return process outside of the United States, contact the nearest Emerson Process Management representative.

Within the United States, call the Emerson Process Management Instrument and Valves Response Center using the 1-800-654-RSMT (7768) toll-free number. This center, available 24 hours a day, will assist you with any needed information or materials.

The center will ask for product model and serial numbers, and will provide a Return Material Authorization (RMA) number. The center will also ask for the process material to which the product was last exposed.

CAUTION

Individuals who handle products exposed to a hazardous substance can avoid injury if they are informed of and understand the hazard. If the product being returned was exposed to a hazardous substance as defined by OSHA, a copy of the required Material Safety Data Sheet (MSDS) for each hazardous substance identified must be included with the returned goods.

Emerson Process Management Instrument and Valves Response Center representatives will explain the additional information and procedures necessary to return goods exposed to hazardous substances.

MODELS COVERED

The following Rosemount 2051 Pressure Transmitters are covered by this manual:

Rosemount 2051C Coplanar™ Pressure Transmitter

2051CD - Differential Pressure Transmitter

Measures differential pressure up to 2000 psi (137,9 bar)

2051CG - Gage Pressure Transmitter

Measures gage pressure up to 2000 psi (137,9 bar)

Rosemount 2051T In-Line Pressure Transmitter

2051TG - Gage Pressure Transmitter

Measures gage pressure up to 10000 psi (689,5 bar)

2051TA - Absolute Pressure Transmitter

Measures absolute pressure up to 10000 psi (689,5 bar)

Rosemount 2051L Liquid Level Pressure Transmitter

2051L - Flange-Mounted Liquid Level Transmitter

Provides precise level and specific gravity measurements up to 300 psi (20,7 bar) for a wide variety of tank configurations

Section 2 Installation

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OVERVIEW

The information in this section covers installation considerations for the Rosemount 2051 with FOUNDATION fieldbus. A Quick Installation Guide for FOUNDATION fieldbus (document number 00825-0200-4101) is shipped with every transmitter to describe basic pipe-fitting and wiring procedures for initial installation. Dimensional drawings for each 2051 variation and mounting configuration are also included.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operation. Information that raises potential safety issues is indicated with a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings

⚠ WARNING

Explosions could result in death or serious injury:

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Please review the approvals section of the 2051 reference manual for any restrictions associated with a safe installation.

- Before connecting a Field Communicator in an explosive atmosphere, ensure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an Explosion-Proof/Flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

WARNING

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals.

Process leaks could result in death or serious injury.

- Install and tighten all four flange bolts before applying pressure.
- Do not attempt to loosen or remove flange bolts while the transmitter is in service.

Replacement equipment or spare parts not approved by Emerson Process Management for use as spare parts could reduce the pressure retaining capabilities of the transmitter and may render the instrument dangerous.

- Use only bolts supplied or sold by Emerson Process Management as spare parts.
- Refer to page A-25 for a complete list of spare parts.

Improper assembly of manifolds to traditional flange can damage sensor module.

- For safe assembly of manifold to traditional flange, bolts must break back plane of flange web (i.e., bolt hole) but must not contact sensor module housing.

GENERAL CONSIDERATIONS

Measurement accuracy depends upon proper installation of the transmitter and impulse piping. Mount the transmitter close to the process and use a minimum of piping to achieve best accuracy. Also, consider the need for easy access, personnel safety, practical field calibration, and a suitable transmitter environment. Install the transmitter to minimize vibration, shock, and temperature fluctuation.

IMPORTANT

Install the enclosed pipe plug (found in the box) in unused conduit opening with a minimum of five threads engaged to comply with explosion-proof requirements.

For material compatibility considerations, see document number 00816-0100-3045 on www.emersonprocess.com/rosemount.

MECHANICAL CONSIDERATIONS

NOTE

For steam service or for applications with process temperatures greater than the limits of the transmitter, do not blow down impulse piping through the transmitter. Flush lines with the blocking valves closed and refill lines with water before resuming measurement.

NOTE

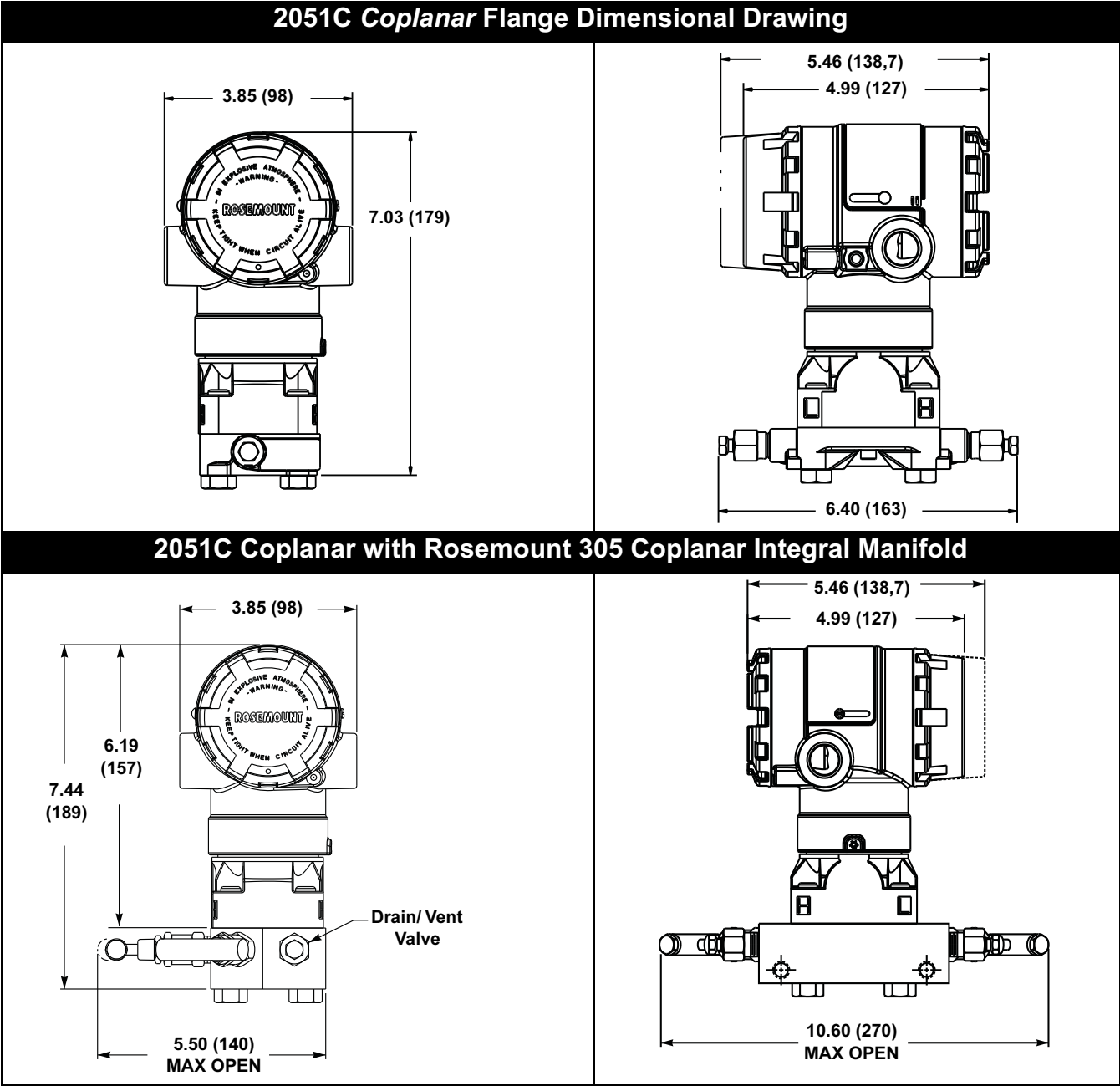
When the transmitter is mounted on its side, position the Coplanar flange to ensure proper venting or draining. Mount the flange as shown in Figure 2-8 on page 2-16, keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

ENVIRONMENTAL CONSIDERATIONS

Best practice is to mount the transmitter in an environment that has minimal ambient temperature change. The transmitter electronics temperature operating limits are -40 to 185 °F (-40 to 85 °C). Refer to Appendix A: Reference Data that lists the sensing element operating limits. Mount the transmitter so that it is not susceptible to vibration and mechanical shock and does not have external contact with corrosive materials.

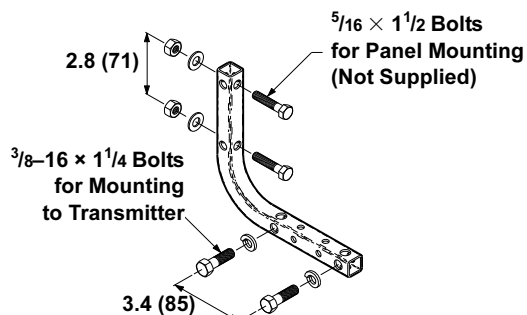
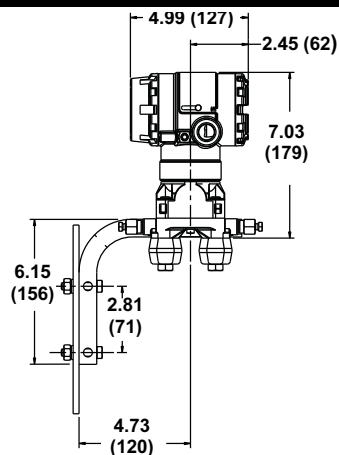
INSTALLATION
PROCEDURES

Dimensional Drawings

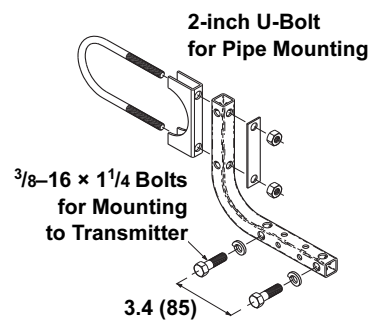
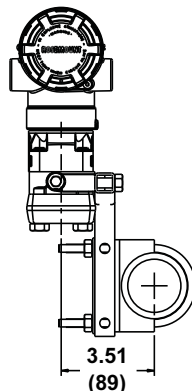
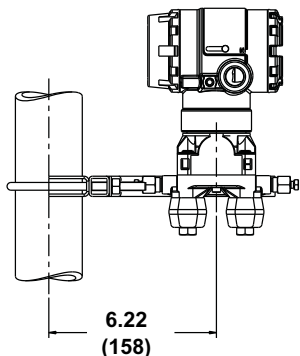


Coplanar Flange Mounting Configurations with Optional Bracket (B4) for 2-in. Pipe or Panel Mounting

PANEL MOUNTING

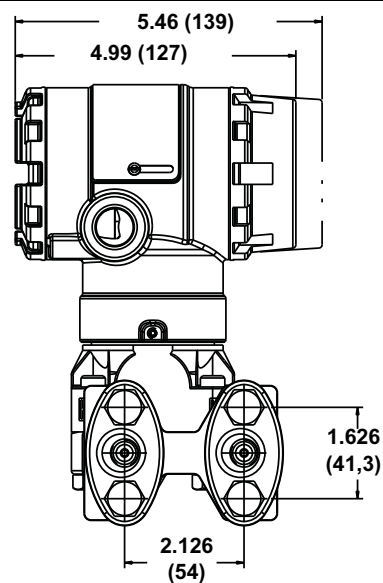
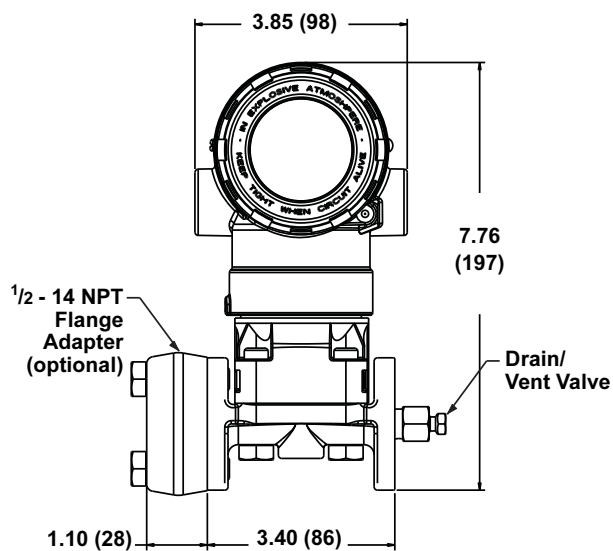


PIPE MOUNTING

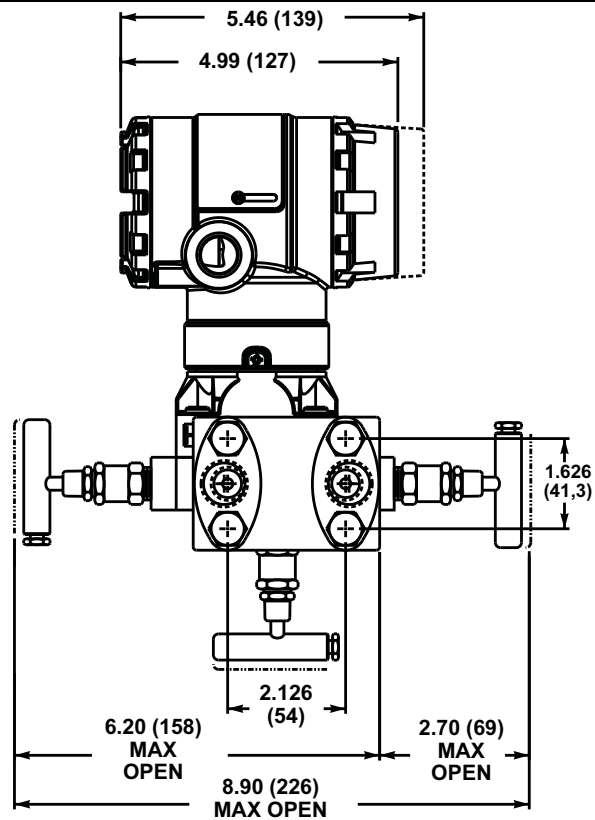
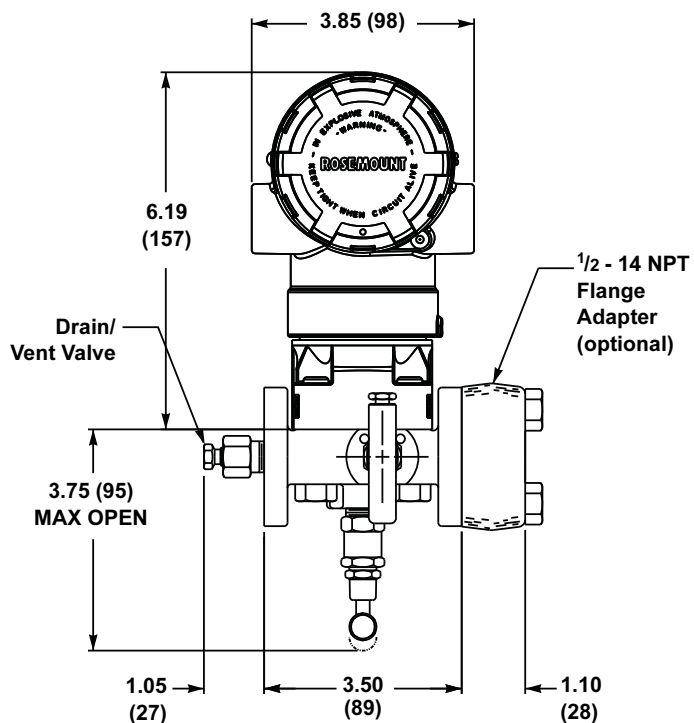


Dimensions are in inches (millimeters)

2051C Coplanar with Traditional Flange

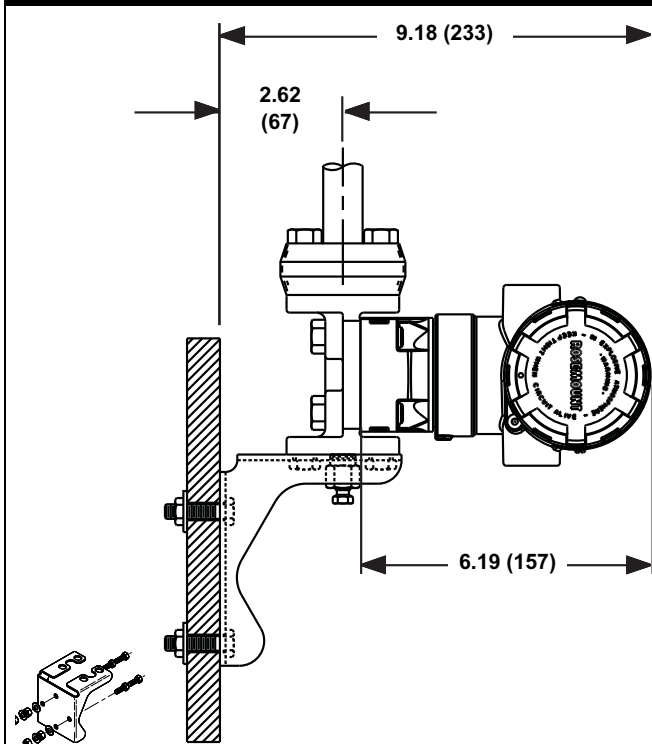


2051C Coplanar with Rosemount 305 Traditional Integral Manifold

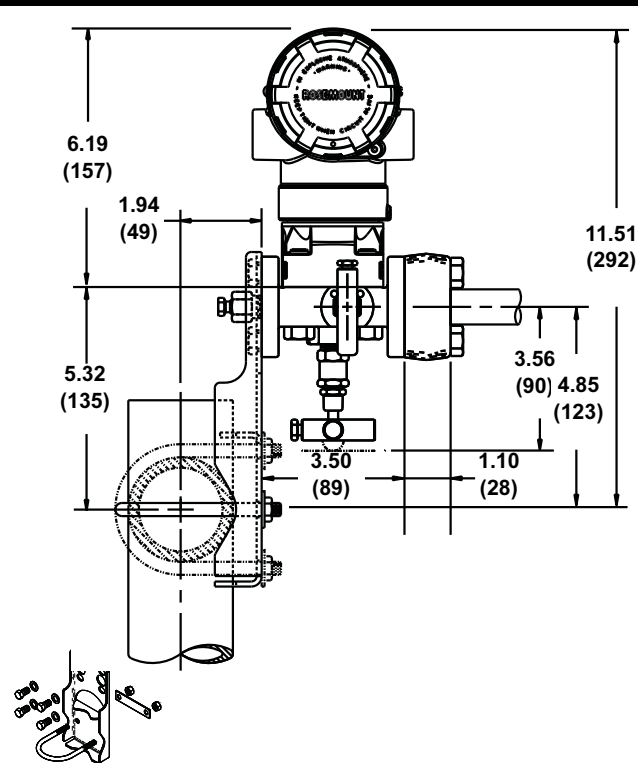


Traditional Flange Mounting Configurations with Optional Brackets for 2-in. Pipe or Panel Mounting

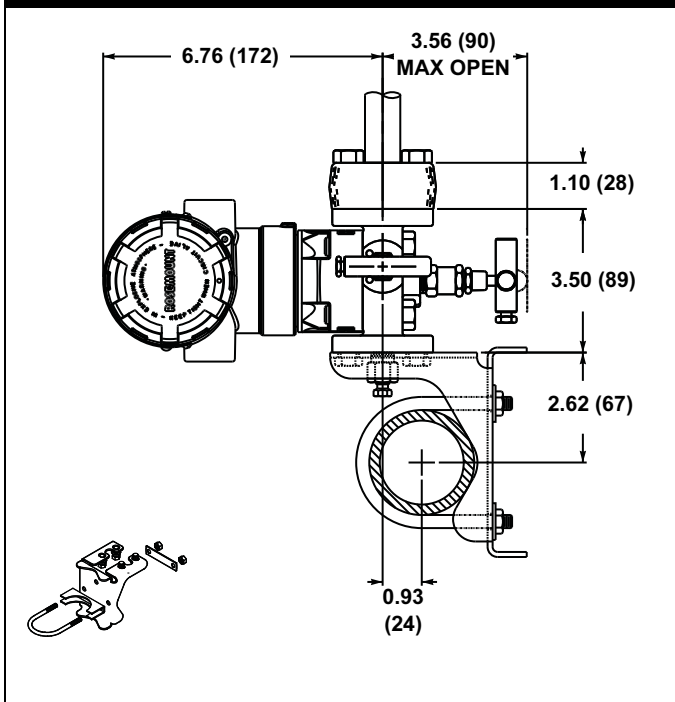
Panel Mount (Bracket Option B2 / B8)



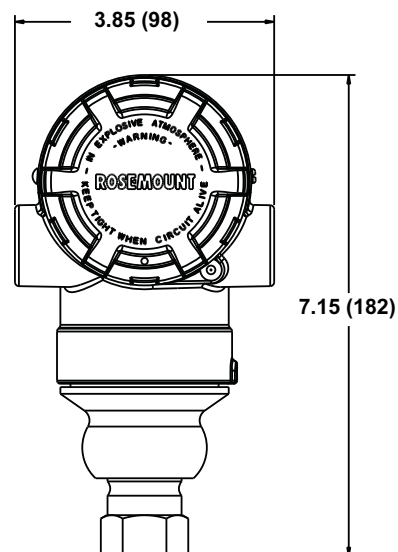
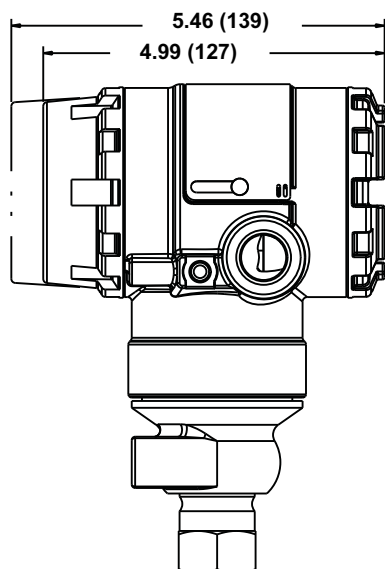
Pipe Mount (Bracket Option B3 / B9 / BC)



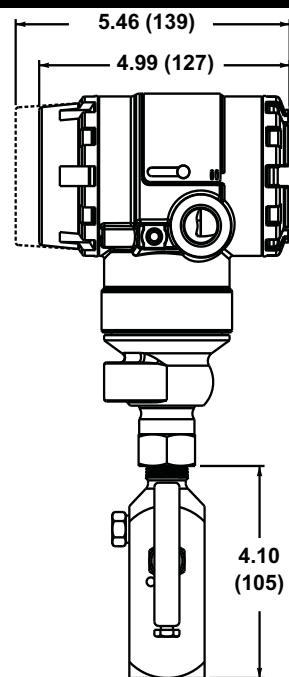
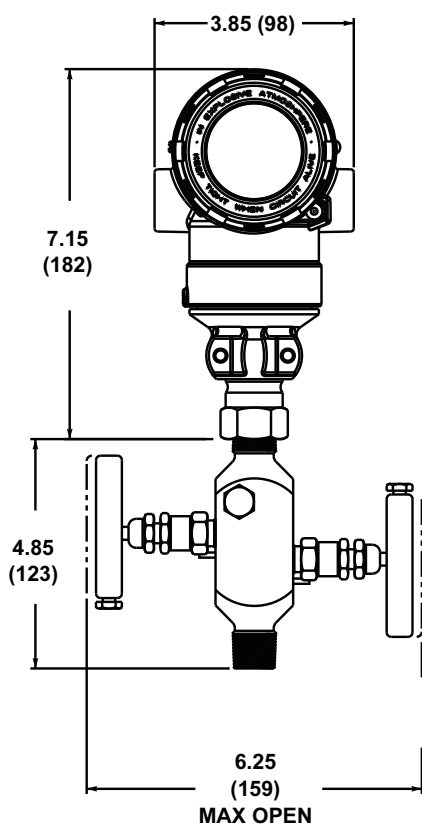
Pipe Mount (Bracket Option B1 / B7 / BA)



2051T Dimensional Drawings

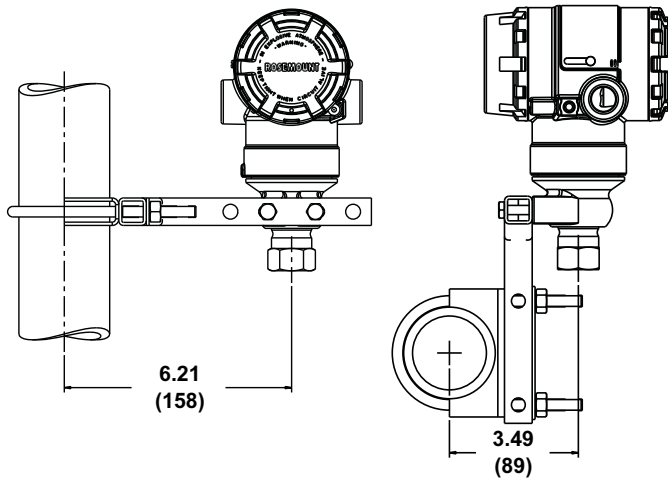


2051T with Rosemount 306 Integral Manifold

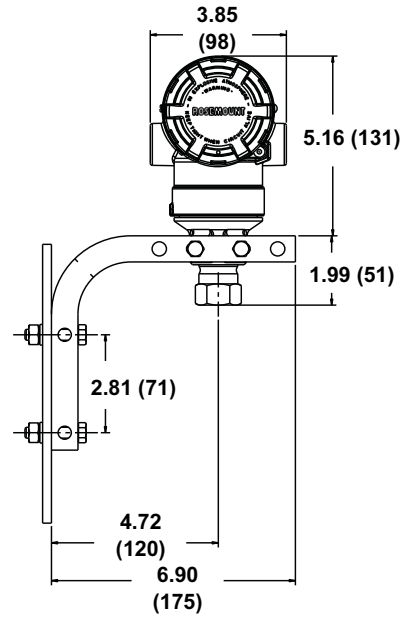


2051T Typical Mounting Configurations with Optional Mounting Bracket

Pipe Mounting



Panel Mounting



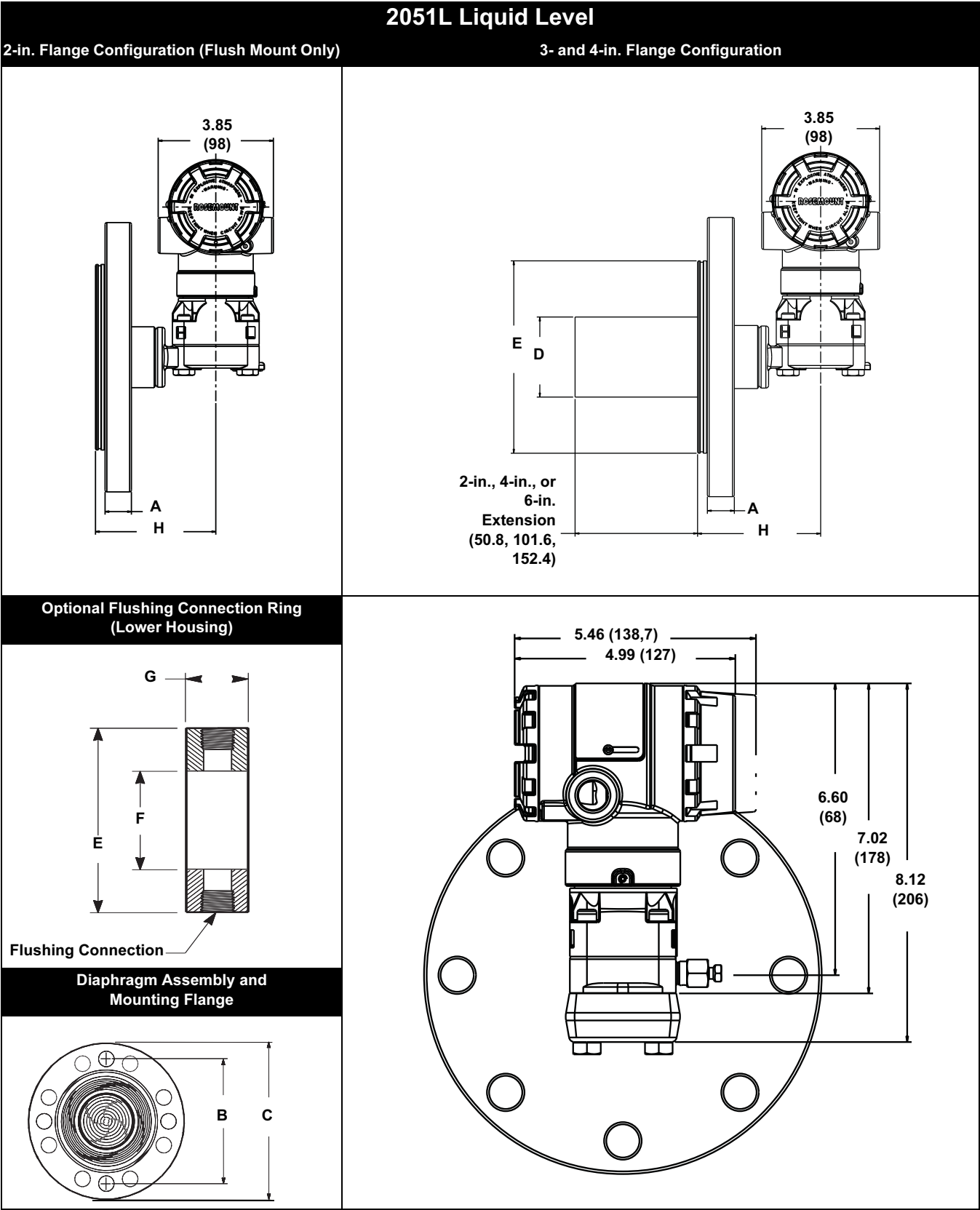


Table 2-1. 2051L Dimensional Specifications

Except where indicated, dimensions are in inches (millimeters).

Class	Pipe Size	Flange Thickness A	Bolt Circle Diameter B	Outside Diameter C	No. of Bolts	Bolt Hole Diameter	Extension Diameter ⁽¹⁾ D	O.D. Gasket Surface E
ASME B16.5 (ANSI) 150	2 (51)	0.69 (18)	4.75 (121)	6.0 (152)	4	0.75 (19)	NA	3.6 (92)
	3 (76)	0.88 (22)	6.0 (152)	7.5 (191)	4	0.75 (19)	2.58 (66)	5.0 (127)
	4 (102)	0.88 (22)	7.5 (191)	9.0 (229)	8	0.75 (19)	3.5 (89)	6.2 (158)
ASME B16.5 (ANSI) 300	2 (51)	0.82 (21)	5.0 (127)	6.5 (165)	8	0.75 (19)	NA	3.6 (92)
	3 (76)	1.06 (27)	6.62 (168)	8.25 (210)	8	0.88 (22)	2.58 (66)	5.0 (127)
	4 (102)	1.19 (30)	7.88 (200)	10.0 (254)	8	0.88 (22)	3.5 (89)	6.2 (158)
DIN 2501 PN 10–40	DN 50	20 mm	125 mm	165 mm	4	18 mm	NA	4.0 (102)
DIN 2501 PN 25/40	DN 80	24 mm	160 mm	200 mm	8	18 mm	65 mm	5.4 (138)
	DN 100	24 mm	190 mm	235 mm	8	22 mm	89 mm	6.2 (158)

Class	Pipe Size	Process Side F	Lower Housing G		H
			1/4 NPT	1/2 NPT	
ASME B16.5 (ANSI) 150	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
ASME B16.5 (ANSI) 300	2 (51)	2.12 (54)	0.97 (25)	1.31 (33)	5.65 (143)
	3 (76)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	4 (102)	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 10–40	DN 50	2.4 (61)	0.97 (25)	1.31 (33)	5.65 (143)
DIN 2501 PN 25/40	DN 80	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)
	DN 100	3.6 (91)	0.97 (25)	1.31 (33)	5.65 (143)

(1) Tolerances are -0.020 and +0.040 (-0.51 and +1.02)

Mount the Transmitter

Process Flange Orientation

Mount the process flanges with sufficient clearance for process connections. For safety reasons, place the drain/vent valves so the process fluid is directed away from possible human contact when the vents are used. In addition, consider the accessibility for a testing or calibration input.

NOTE

Most transmitters are calibrated in the horizontal position. Mounting the transmitter in any other position will shift the zero point to the equivalent amount of liquid head pressure caused by the varied mounting position. To reset zero point, refer to “Sensor Trim” on page 4-5.

Terminal Side of Electronics Housing

Mount the transmitter so the terminal side is accessible. Clearance of 0.75-in. (19 mm) is required for cover removal. Use a conduit plug on the unused side of the conduit opening.

Circuit Side of Electronics Housing

Provide 0.75 in. (19 mm) of clearance for units without an LCD display. Provide 3 in. (76 mm) of clearance for units installed with LCD.

Cover Installation

Always ensure a proper seal by installing the electronics housing covers so that metal contacts metal. Use Rosemount o-rings.

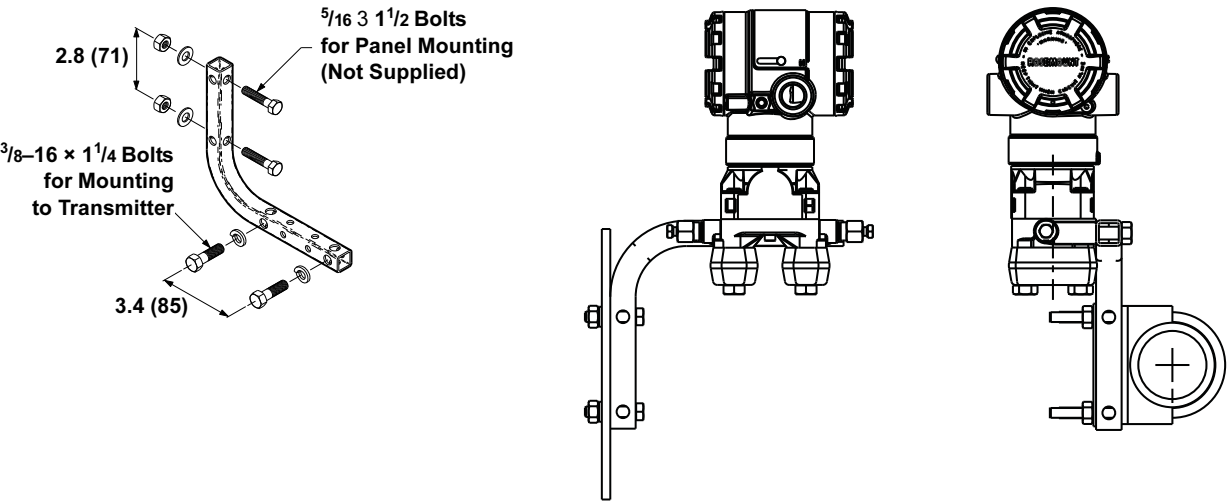
Mounting Brackets

Rosemount 2051 Transmitters may be panel-mounted or pipe-mounted through an optional mounting bracket. Refer to Table 2-2 for the complete offering and see Figure 2-1 through Figure 2-5 on pages 2-11 and 2-12 for dimensions and mounting configurations.

Table 2-2. Mounting Brackets

2051 Brackets										
Option Code	Process Connections			Mounting			Materials			
	Coplanar	In-Line	Traditional	Pipe Mount	Panel Mount	Flat Panel Mount	CS Bracket	SST Bracket	CS Bolts	SST Bolts
B4	X	X		X	X	X		X		X
B1			X	X			X		X	
B2			X		X		X		X	
B3			X			X	X		X	
B7			X	X			X			X
B8			X		X		X			X
B9			X			X	X			X
BA			X	X				X		X
BC			X			X		X		X

Figure 2-1. Mounting Bracket Option Code B4



Rosemount 2051

Figure 2-2. Mounting Bracket Option Codes B1, B7, and BA

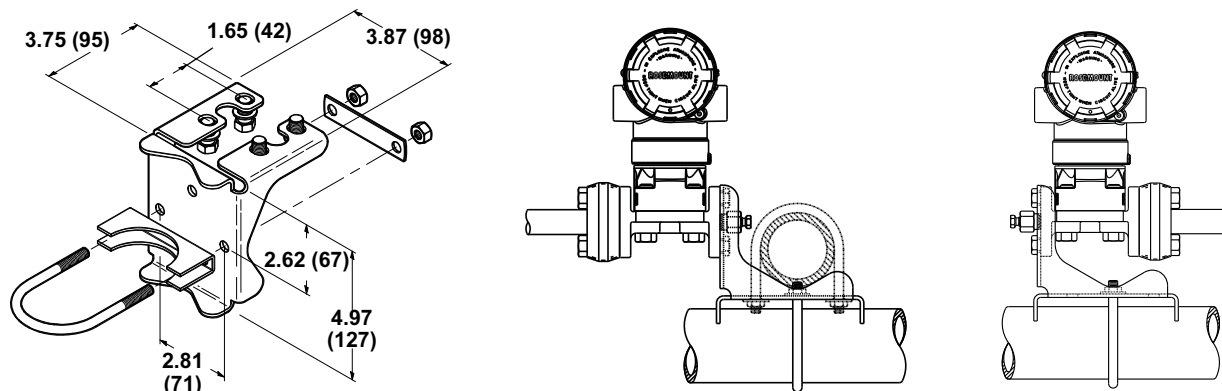


Figure 2-4. Panel Mounting Bracket Option Codes B2 and B8

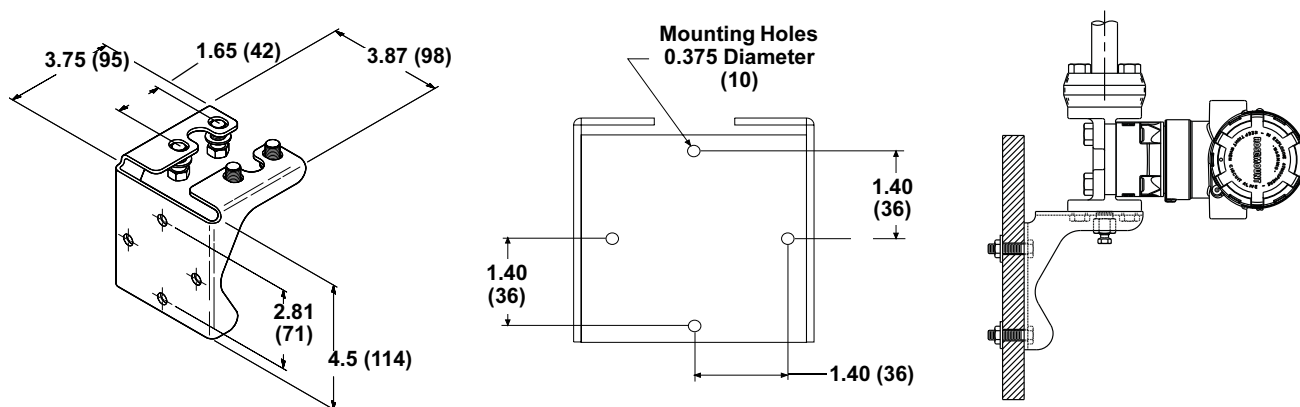
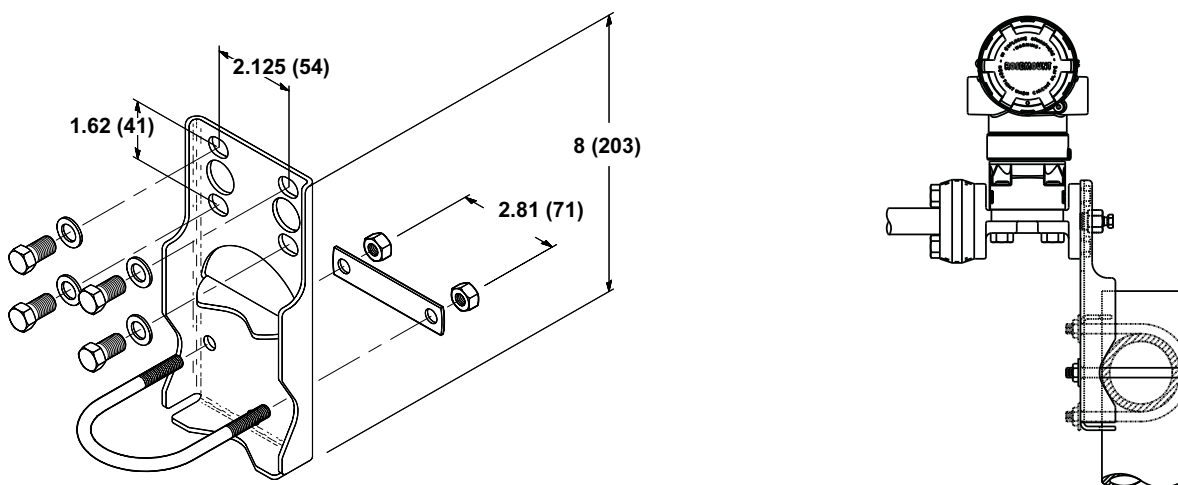


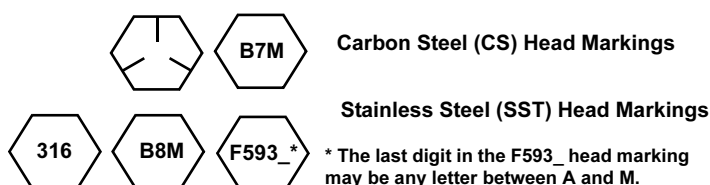
Figure 2-5. Flat Mounting Bracket Option Codes B3 and BC



NOTE
Dimensions are in inches (millimeters).

Flange Bolts

The 2051 is shipped with a Coplanar flange installed with four 1.75-in. (44 mm) flange bolts. See Figure 2-6 and Figure 2-7 on pages 2-14 and 2-14. Stainless steel bolts are coated with a lubricant to ease installation. Carbon steel bolts do not require lubrication. No additional lubricant should be applied when installing either type of bolt. Bolts are identified by their head markings:



Bolt Installation



Only use bolts supplied with the 2051 or provided by Emerson Process Management as spare parts. When installing the transmitter to one of the optional mounting brackets, torque the bolts to 125 in.-lb. (0,9 N-m). Use the following bolt installation procedure:

1. Finger-tighten the bolts.
2. Torque the bolts to the initial torque value using a crossing pattern.
3. Torque the bolts to the final torque value using the same crossing pattern.

Torque values for the flange and manifold adapter bolts are as follows:

Table 2-3. Bolt Installation Torque Values

Bolt Material	Initial Torque Value	Final Torque Value
CS-ASTM-A449 Standard	300 in.-lb (34 N-m)	650 in.-lb (73 N-m)
316 SST—Option L4	150 in.-lb (17 N-m)	300 in.-lb (34 N-m)
ASTM-A-193-B7M—Option L5	300 in.-lb (34 N-m)	650 in.-lb (73 N-m)
ASTM-A-193 Class 2, Grade B8M—Option L8	150 in.-lb (17 N-m)	300 in.-lb (34 N-m)

Figure 2-6. Traditional Flange Bolt Configurations

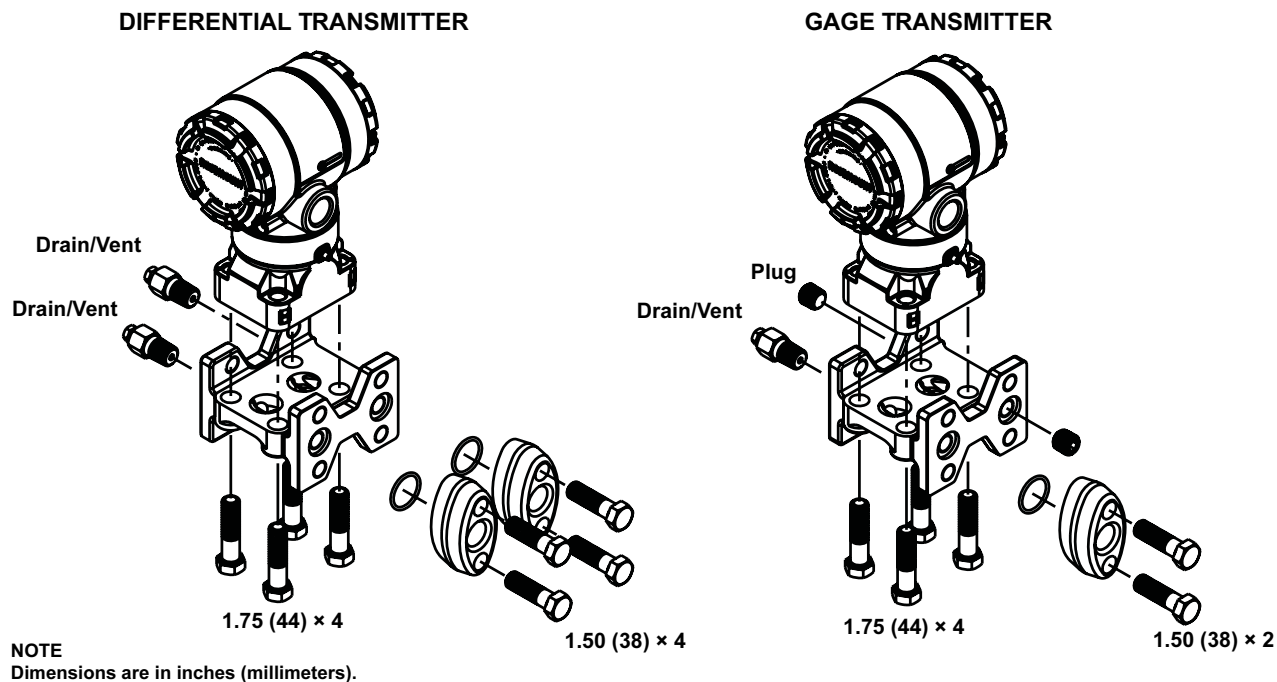
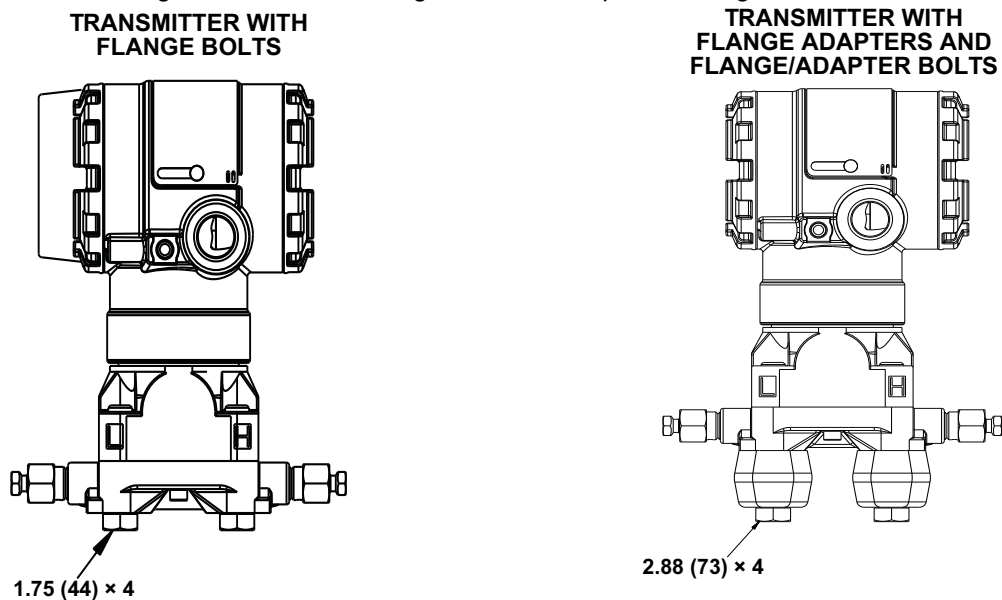


Figure 2-7. Mounting Bolts and Bolt Configurations for Coplanar Flange



Description	Size in. (mm)
Flange Bolts	1.75 (44)
Flange/Adapter Bolts	2.88 (73)
Manifold/Flange Bolts	2.25 (57)

NOTE
Dimensions are in inches (millimeters).

Impulse Piping

The piping between the process and the transmitter must accurately transfer the pressure to obtain accurate measurements. There are six possible sources of impulse piping error: pressure transfer, leaks, friction loss (particularly if purging is used), trapped gas in a liquid line, liquid in a gas line, and density variations between the legs.

The best location for the transmitter in relation to the process pipe is dependent on the process. Use the following guidelines to determine transmitter location and placement of impulse piping:

- Keep impulse piping as short as possible.
- For liquid service, slope the impulse piping at least 1 in./foot (8 cm/m) upward from the transmitter toward the process connection.
- For gas service, slope the impulse piping at least 1 in./foot (8 cm/m) downward from the transmitter toward the process connection.
- Avoid high points in liquid lines and low points in gas lines.
- Make sure both impulse legs are the same temperature.
- Use impulse piping large enough to avoid friction effects and blockage.
- Vent all gas from liquid piping legs.
- When using a sealing fluid, fill both piping legs to the same level.
- When purging, make the purge connection close to the process taps and purge through equal lengths of the same size pipe. Avoid purging through the transmitter.
- Keep corrosive or hot (above 250 °F [121 °C]) process material out of direct contact with the sensor module and flanges.
- Prevent sediment deposits in the impulse piping.
- Maintain equal leg of head pressure on both legs of the impulse piping.
- Avoid conditions that might allow process fluid to freeze within the process flange.

Mounting Requirements

Impulse piping configurations depend on specific measurement conditions. Refer to Figure 2-8 for examples of the following mounting configurations:

Liquid Flow Measurement

- Place taps to the side of the line to prevent sediment deposits on the process isolators.
- Mount the transmitter beside or below the taps so gases vent into the process line.
- Mount drain/vent valve upward to allow gases to vent.

Gas Flow Measurement

- Place taps in the top or side of the line.
- Mount the transmitter beside or above the taps so to drain liquid into the process line.

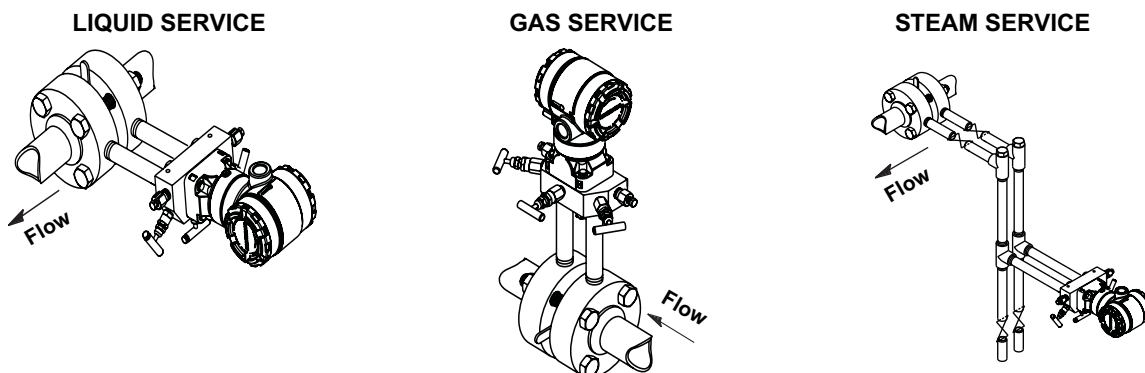
Steam Flow Measurement

- Place taps to the side of the line.
- Mount the transmitter below the taps to ensure that impulse piping will remain filled with condensate.
- In steam service above 250 °F (121 °C), fill impulse lines with water to prevent steam from contacting the transmitter directly and to ensure accurate measurement start-up.

NOTE


For steam or other elevated temperature services, it is important that temperatures at the process connection do not exceed the transmitter's process temperature limits. See "Process Temperature Limits" on page A-7 for details.

Figure 2-8. Installation Examples



Process Connections

Coplanar or Traditional Process Connection

 Install and tighten all four flange bolts before applying pressure, or process leakage will result. When properly installed, the flange bolts will protrude through the top of the sensor module housing. Do not attempt to loosen or remove the flange bolts while the transmitter is in service.

Flange Adaptors:

Rosemount 2051DP and GP process connections on the transmitter flanges are 1/4–18 NPT. Flange adapters are available with standard 1/2–14 NPT Class 2 connections. The flange adapters allow users to disconnect from the process by removing the flange adapter bolts. Use plant-approved lubricant or sealant when making the process connections. Refer to Dimensional Drawings on page 2-3 for the distance between pressure connections. This distance may be varied $\pm 1/8$ in. (3.2 mm) by rotating one or both of the flange adapters.

To install adapters to a Coplanar flange, perform the following procedure:

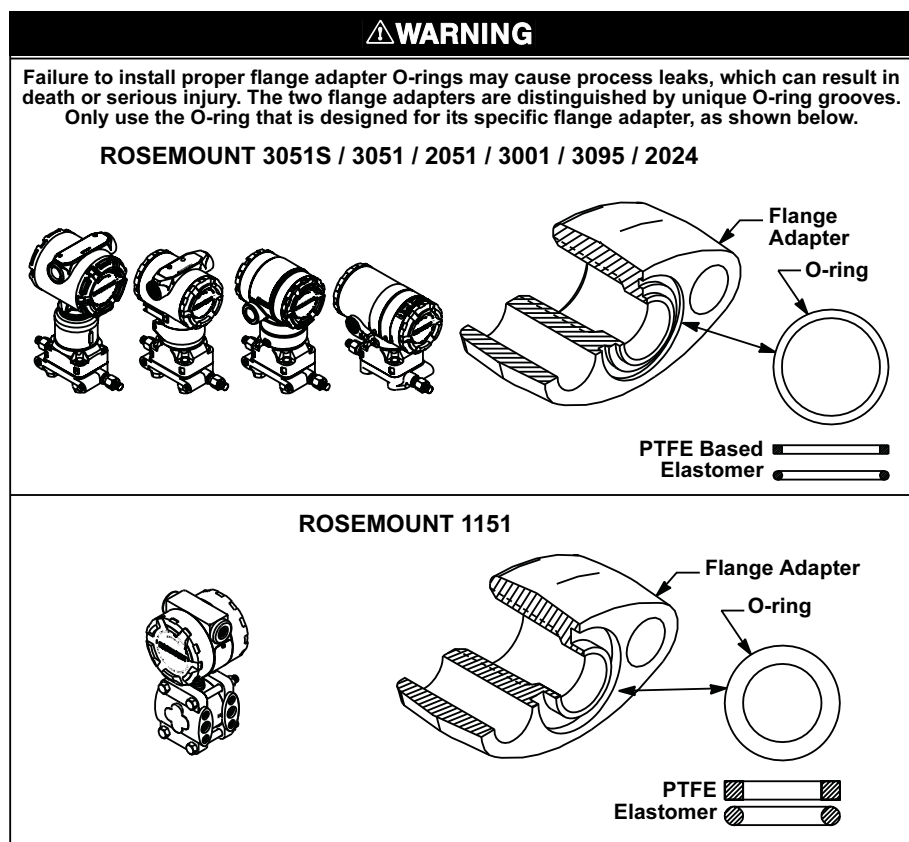
1. Remove the flange bolts.
2. Leaving the flange in place, move the adapters into position with the o-ring installed.
3. Clamp the adapters and the Coplanar flange to the transmitter sensor module using the larger of the bolts supplied.
4. Tighten the bolts. Refer to “Flange Bolts” on page 2-13 for torque specifications.

Whenever you remove flanges or adapters, visually inspect the PTFE o-rings. Replace with o-ring designed for Rosemount transmitter if there are any signs of damage, such as nicks or cuts. Undamaged o-rings may be reused. If you replace the o-rings, retorque the flange bolts after installation to compensate for cold flow. Refer to the process sensor body reassembly procedure in Section 5: Troubleshooting.

O-rings:

The two styles of Rosemount flange adapters (Rosemount 1151 and Rosemount 3051/2051/2024/3095) each require a unique O-ring (see Figure 2-9). Use only the O-ring designed for the corresponding flange adaptor.

Figure 2-9. O-Rings.

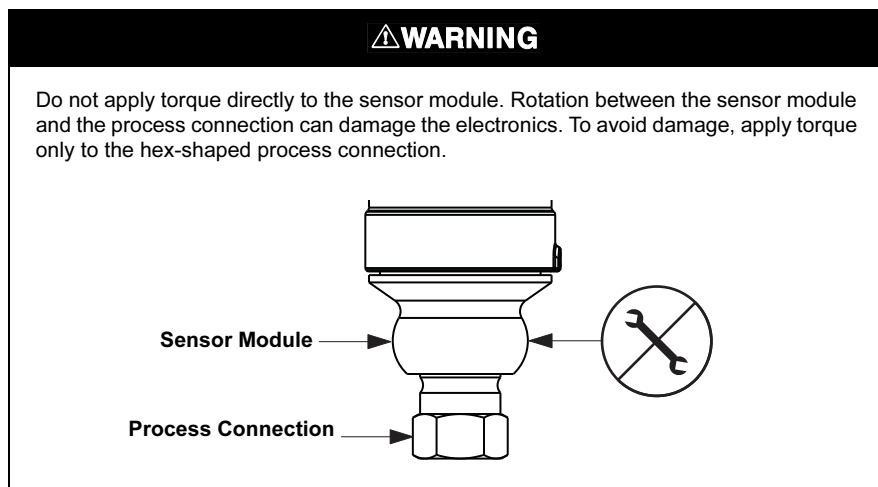


⚠ When compressed, PTFE O-rings tend to “cold flow,” which aids in their sealing capabilities.

NOTE

PTFE O-rings should be replaced if the flange adapter is removed.

Inline Process Connection

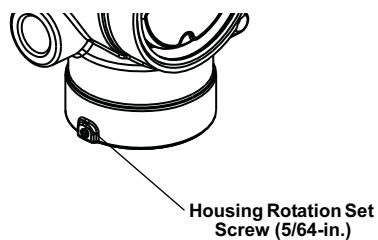


Housing Rotation

The electronics housing can be rotated up to 180 degrees in either direction to improve field access, or to better view the optional LCD display. To rotate the housing, perform the following procedure:

1. Loosen the housing rotation set screw using a $\frac{5}{64}$ -in. hex wrench.
2. Turn the housing left or right up to 180° from its original position. Over rotating will damage the transmitter.
3. Retighten the housing rotation set screw.

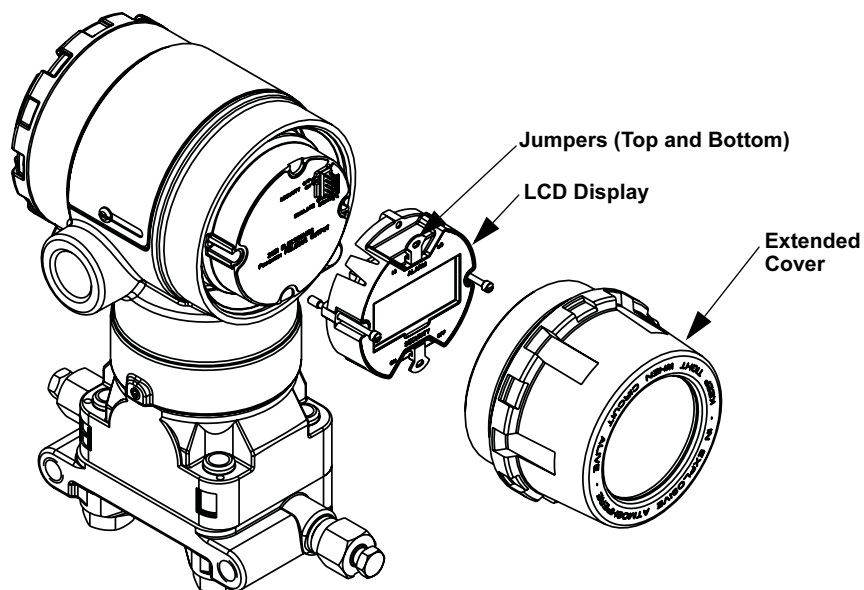
Figure 2-10. Housing Rotation



LCD Display

Transmitters ordered with the LCD option are shipped with the display installed. Installing the display on an existing 2051 transmitter requires a small instrument screwdriver.

Figure 2-11. LCD Display



Tagging

Commissioning (Paper) Tag

When commissioning more than one device on a fieldbus segment, it can be difficult to identify which device is at a particular location. A removable tag provided with the transmitter can aid in this process by linking the Device ID and a physical location. The Device ID is a unique code that identifies a particular device in the absence of a device tag. The device tag is used by the customer as an operational identification for the device and is usually defined by the Piping and Instrumentation Diagram (P & ID).

The installer should note the physical location in both places on the removable commissioning tag and tear off the bottom portion. This should be done for each device on the segment. The bottom portion of the tags can be used for commissioning the segment in the control system, providing a direct link between the Device ID and the tag location.

<div style="border: 1px solid black; width: 20px; height: 20px; margin: 0 auto; border-radius: 50%;"></div> <p>COMMISSIONING TAG Device ID: 0011512051010001440-121698091725 PD Tag:</p> <p style="text-align: center;">— — — — Tear Here — — — —</p> <p>Device ID: 0011512051010001440-121698091725 PD Tag:</p>

ELECTRICAL CONSIDERATIONS

NOTE

Make sure all electrical installation is in accordance with national and local code requirements.

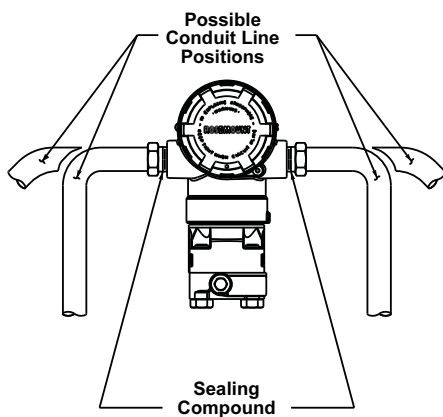
Conduit Installation

⚠ CAUTION

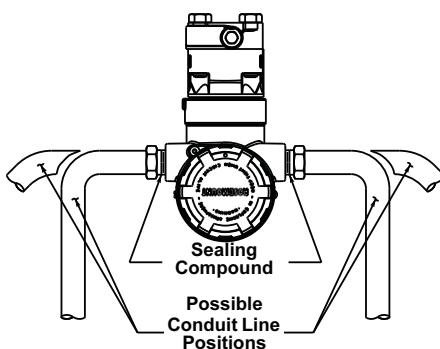
If all connections are not sealed, excess moisture accumulation can damage the transmitter. Make sure to mount the transmitter with the electrical housing positioned downward for drainage. To avoid moisture accumulation in the housing, install wiring with a drip loop, and ensure the bottom of the drip loop is mounted lower than the conduit connections or the transmitter housing.

Recommended conduit connections are shown in Figure 2-12.

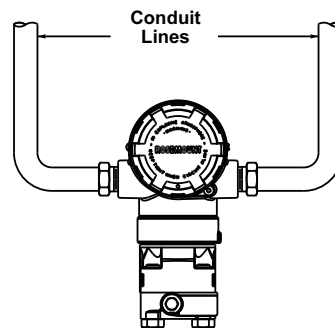
Figure 2-12. Conduit Installation
Diagrams.



CORRECT



CORRECT



INCORRECT

Wiring

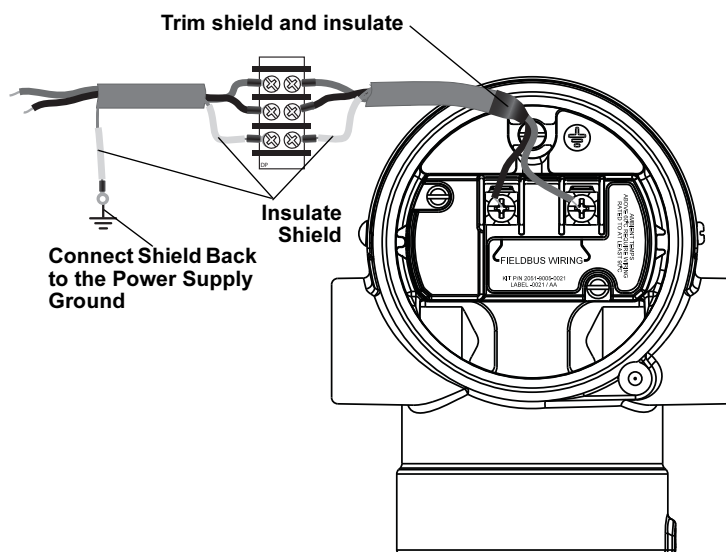
Wiring and power supply requirements can be dependent upon the approval certification. As with all FOUNDATION fieldbus requirements, a conditioned power supply and terminating resistors are required for proper operation. The standard 2051 pressure transmitter terminal block is pictured in Figure 2-13. The terminals are not polarity sensitive. The transmitter requires 9-32 Vdc to operate. Type A FOUNDATION fieldbus wiring 18 awg twisted shielded pair is recommended.

Avoid running instrument cable next to power cables in cable trays or near heavy electrical equipment.

It is important that the instrument cable shield:

- be trimmed close and insulated from touching the transmitter housing
- be connected to the next shield if cable is routed through a junction box
- be connected to a good earth ground at the power supply end

Figure 2-13. FOUNDATION fieldbus Wiring



⚠ CAUTION

Do not connect the power signal wiring to the test terminals. Voltage may burn out the reverse-polarity protection diode in the test connection.

Perform the following procedure to make wiring connections:

- ⚠ 1. Remove the housing cover on terminal compartment side. Do not remove the cover in explosive atmospheres when the circuit is live. Signal wiring supplies all power to the transmitter.
- ⚠ 2. Connect the leads to the two FOUNDATION fieldbus wiring terminals. Refer to Figure 2-14.
3. Plug and seal unused conduit connection on the transmitter housing to avoid moisture accumulation in the terminal side. Install wiring with a drip loop. Arrange the drip loop so the bottom is lower than the conduit connections and the transmitter housing.

Power Supply

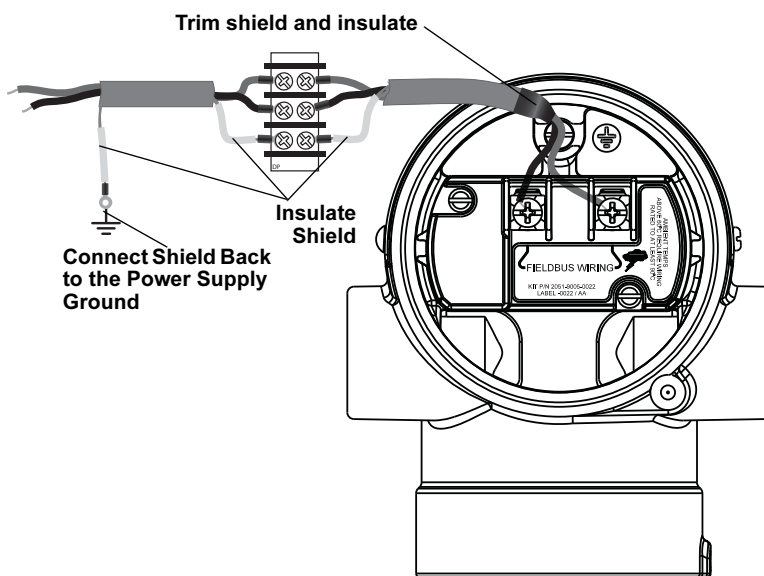
External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage.

Transient Protection Terminal Block

The transmitter will withstand electrical transients of the energy level usually encountered in static discharges or induced switching transients. However, high-energy transients, such as those induced in wiring from nearby lightning strikes, can damage the transmitter.

The transient protection terminal block can be ordered as an installed option (Option Code T1 in the transmitter model number) or as a spare part to retrofit existing 2051 transmitters in the field. See “Spare Parts” on page A-38 for spare part numbers. The lightning bolt symbol shown in Figure 2-14 and Figure identifies the transient protection terminal block.

Figure 2-14. Wiring with transient protection



NOTE

The transient protection terminal block does not provide transient protection unless the transmitter case is properly grounded. Use the guidelines to ground the transmitter case. Refer to page 2-25.

Do not run the transient protection ground wire with signal wiring as the ground wire may carry excessive current if a lightning strike occurs.

Jumpers

Security

After you configure the transmitter, you may want to protect the configuration data from unwarranted changes. Each transmitter is equipped with a security jumper that can be positioned “ON” to prevent the accidental or deliberate change of configuration data. The jumper is located on the front side of the electronics module and is labeled SECURITY (see Figure 2-15).



If the transmitter write protection jumper is in the “ON” position, the transmitter will not accept any “writes” to its memory. Configuration changes, such as digital trim and reranging, cannot take place when the transmitter security is on.

NOTE

If the security jumper is not installed, the transmitter will continue to operate in the security OFF configuration.

Configuring Transmitter Security Jumper Procedure

To reposition the jumper, follow the procedure described below.

1. Do not remove the transmitter covers in explosive atmospheres when the circuit is live. If the transmitter is live, set the loop to manual and remove power.
-  2. Remove the housing cover opposite the field terminal side. Do not remove the transmitter covers in explosive atmospheres when the circuit is live.
3. Reposition the jumpers as desired. Refer to Figure 2-15.
-  4. Reattach the transmitter cover. Always ensure a proper seal by installing the electronics housing covers so that metal contacts metal to meet explosion-proof requirements.

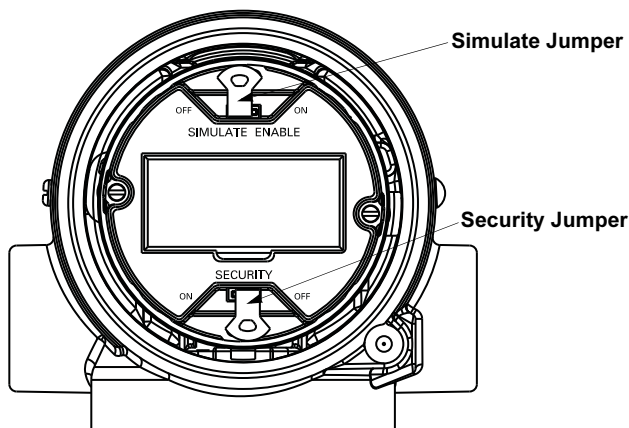
Simulate

The simulate jumper is used in conjunction with the Analog Input (AI) function block. This switch is used to simulate the measurement. To enable the simulate feature, insert the jumper across “ENABLE” (see Figure 2-15) while the transmitter is powered.

NOTE

When power is cycled to the transmitter, simulate is automatically disabled regardless of the position of the jumper. This prevents the transmitter from being accidentally left in simulate mode. Therefore, to enable the simulate feature, the jumper must be inserted *after* power is applied to the transmitter.

Figure 2-15. Transmitter
Jumper Locations



Grounding

⚠ Use the following techniques to properly ground the transmitter case:

Transmitter Case

Always ground the transmitter case in accordance with national and local electrical codes. The most effective transmitter case grounding method is a direct connection to earth ground with minimal impedance. Methods for grounding the transmitter case include:

- **Internal Ground Connection:** The Internal Ground Connection screw is inside the FIELD TERMINALS side of the electronics housing. This screw is identified by a ground symbol (\oplus). The ground connection screw is standard on all Rosemount 2051 transmitters. Refer to Figure 2-16.
- **External Ground Assembly:** This assembly is included with the optional transient protection terminal block (Option Code T1), and it is included with various hazardous location certifications. The External Ground Assembly can also be ordered with the transmitter (Option Code V5), or as a spare part. See "Spare Parts" on page A-25. Refer to Figure 2-17 for location of the External Ground Screw.

Figure 2-16. Internal Ground Screw

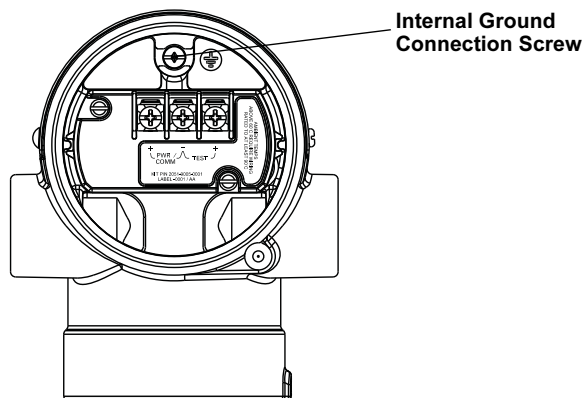
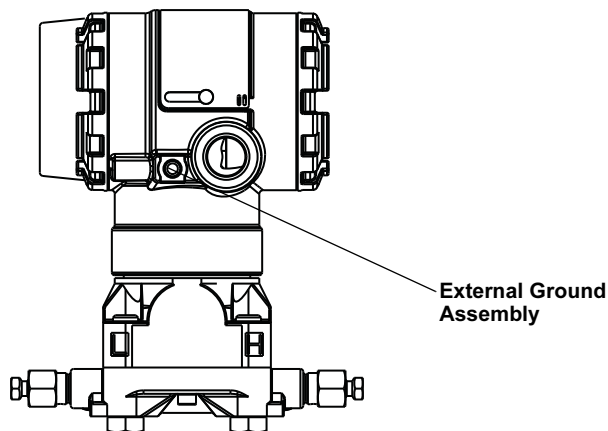


Figure 2-17. External Ground Assembly



NOTE

NOTE
Grounding the transmitter case via threaded conduit connection may not provide sufficient ground continuity.

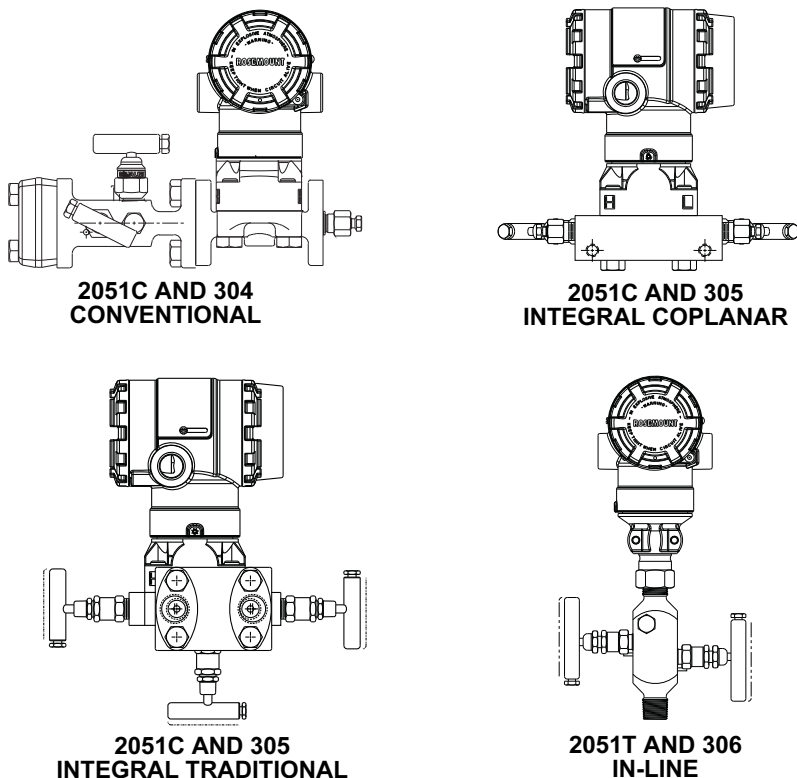
HAZARDOUS LOCATIONS CERTIFICATIONS

⚠ Individual transmitters are clearly marked with a tag indicating the approvals they carry. Transmitters must be installed in accordance with all applicable codes and standards to maintain these certified ratings. Refer to Appendix B: Approval Information for information on these approvals.

ROSEMOUNT 305, 306 AND 304 MANIFOLDS

The 305 Integral Manifold is available in two designs: Traditional and Coplanar. The traditional 305 Integral Manifold can be mounted to most primary elements with mounting adapters in the market today. The 306 Integral Manifold is used with the 2051T in-line transmitters to provide block-and-bleed valve capabilities of up to 10000 psi (690 bar).

Figure 2-18. Manifolds



Rosemount 305 Integral Manifold Installation Procedure

To install a 305 Integral Manifold to a 2051 transmitter:



1. Inspect the PTFE sensor module o-rings. Undamaged o-rings may be reused. If the o-rings are damaged (if they have nicks or cuts, for example), replace with o-rings designed for Rosemount transmitter.

IMPORTANT

If replacing the o-rings, take care not to scratch or deface the o-ring grooves or the surface of the isolating diaphragm while you remove the damaged o-rings.

2. Install the Integral Manifold on the sensor module. Use the four 2.25-in. manifold bolts for alignment. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See “Flange Bolts” on page 2-13 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.
3. If the PTFE sensor module o-rings have been replaced, the flange bolts should be re-tightened after installation to compensate for cold flow of the o-rings.

NOTE

Always perform a zero trim on the transmitter/manifold assembly after installation to eliminate mounting effects.

Rosemount 306 Integral Manifold Installation Procedure

The 306 Manifold is for use only with a 2051T In-line transmitter.



- Assemble the 306 Manifold to the 2051T In-line transmitter with a thread sealant.

Rosemount 304 Conventional Manifold Installation Procedure

To install a 304 Conventional Manifold to a 2051 transmitter:

1. Align the Conventional Manifold with the transmitter flange. Use the four manifold bolts for alignment.
2. Finger tighten the bolts, then tighten the bolts incrementally in a cross pattern to final torque value. See “Flange Bolts” on page 2-6 for complete bolt installation information and torque values. When fully tightened, the bolts should extend through the top of the sensor module housing.
3. Leak-check assembly to maximum pressure range of transmitter.

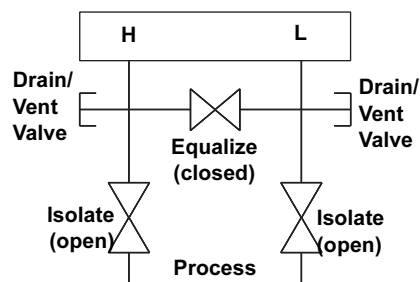


See “Safety Messages” on page 2-1 for complete warning information.

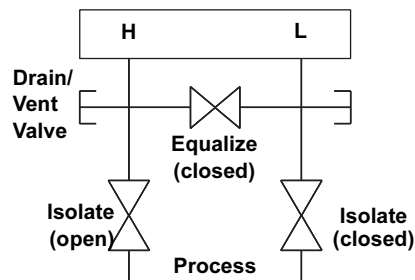
Integral Manifold Operation

Three-valve configuration shown.

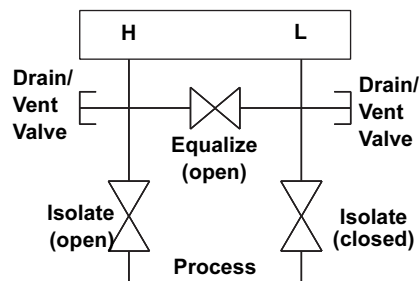
In normal operation the two isolate valves between the process and instrument ports will be open and the equalizing valve(s) will be closed.



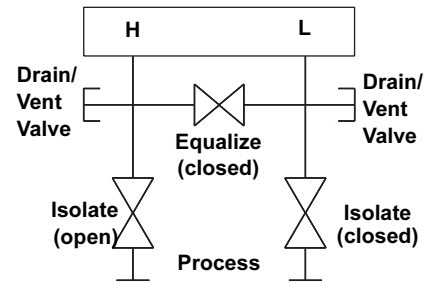
To zero the 2051, close the isolate valve to the low pressure (downstream side) of the transmitter first.



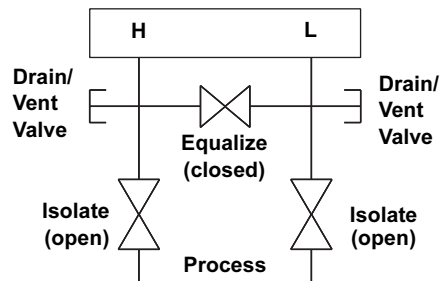
Next, open the center (equalize) valve(s) to equalize the pressure on both sides of the transmitter.



The manifold valves are now in the proper configuration for zeroing the transmitter. To return the transmitter to service, close the equalizing valve(s) first.



Next, open the isolate valve on the low pressure side of the transmitter.



LIQUID LEVEL MEASUREMENT

Differential pressure transmitters used for liquid level applications measure hydrostatic pressure head. Liquid level and specific gravity of a liquid are factors in determining pressure head. This pressure is equal to the liquid height above the tap multiplied by the specific gravity of the liquid. Pressure head is independent of volume or vessel shape.

Open Vessels

A pressure transmitter mounted near a tank bottom measures the pressure of the liquid above.

Make a connection to the high pressure side of the transmitter, and vent the low pressure side to the atmosphere. Pressure head equals the liquid's specific gravity multiplied by the liquid height above the tap.

Zero range suppression is required if the transmitter lies below the zero point of the desired level range. Figure 2-19 shows a liquid level measurement example.

Closed Vessels

Pressure above a liquid affects the pressure measured at the bottom of a closed vessel. The liquid specific gravity multiplied by the liquid height plus the vessel pressure equals the pressure at the bottom of the vessel.

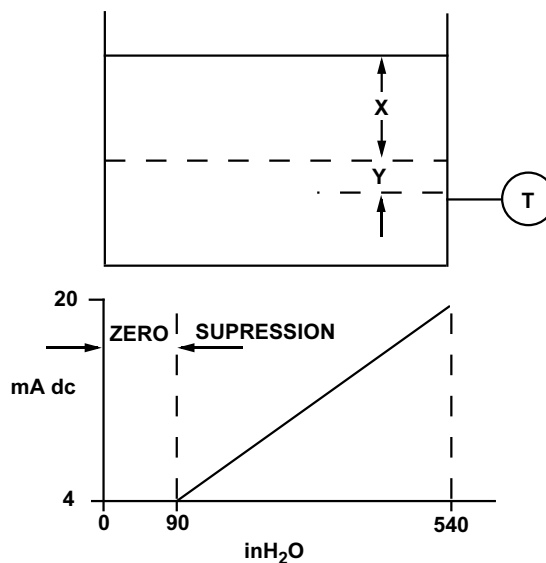
To measure true level, the vessel pressure must be subtracted from the vessel bottom pressure. To do this, make a pressure tap at the top of the vessel and connect this to the low side of the transmitter. Vessel pressure is then equally applied to both the high and low sides of the transmitter. The resulting differential pressure is proportional to liquid height multiplied by the liquid specific gravity.

Dry Leg Condition

Low-side transmitter piping will remain empty if gas above the liquid does not condense. This is a dry leg condition. Range determination calculations are the same as those described for bottom-mounted transmitters in open vessels, as shown in Figure 2-19.

Figure 2-19. Liquid Level Measurement Example.

Let **X** equal the vertical distance between the minimum and maximum measurable levels (500 in.).
Let **Y** equal the vertical distance between the transmitter datum line and the minimum measurable level (100 in.).
Let **SG** equal the specific gravity of the fluid (0.9).
Let **h** equal the maximum head pressure to be measured in inches of water.
Let **e** equal head pressure produced by **Y** expressed in inches of water.
Let **Range** equal **e** to **e + h**.
Then $h = (X)(SG)$
 $= 500 \times 0.9$
 $= 450 \text{ inH}_2\text{O}$
 $e = (Y)(SG)$
 $= 100 \times 0.9$
 $= 90 \text{ inH}_2\text{O}$
Range = 90 to 540 inH₂O

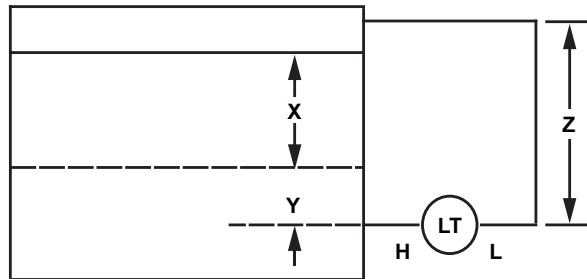


Wet Leg Condition

Condensation of the gas above the liquid slowly causes the low side of the transmitter piping to fill with liquid. The pipe is purposely filled with a convenient reference fluid to eliminate this potential error. This is a wet leg condition.

The reference fluid will exert a head pressure on the low side of the transmitter. Zero elevation of the range must then be made. See Figure 2-20

Figure 2-20. Wet Leg Example.



Let **X** equal the vertical distance between the minimum and maximum measurable levels (500 in.).

Let **Y** equal the vertical distance between the transmitter datum line and the minimum measurable level (50 in.).

Let **z** equal the vertical distance between the top of the liquid in the wet leg and the transmitter datum line (600 in.).

Let **SG₁** equal the specific gravity of the fluid (1.0).

Let **SG₂** equal the specific gravity of the fluid in the wet leg (1.1).

Let **h** equal the maximum head pressure to be measured in inches of water.

Let **e** equal the head pressure produced by **Y** expressed in inches of water.

Let **s** equal head pressure produced by **z** expressed in inches of water.

Let **Range** equal **e – s** to **h + e – s**.

Then **h** = **(X)(SG₁)**

= 500 x 1.0

= 500 in H₂O

e = **(Y)(SG₁)**

= 50 x 1.0

= 50 inH₂O

s = **(z)(SG₂)**

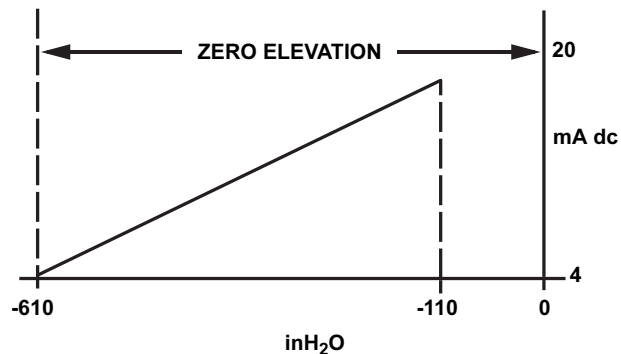
= 600 x 1.1

= 660 inH₂O

Range = **e – s** to **h + e – s**.

= 50 – 660 to 500 + 50 – 660

= –610 to –110 inH₂O

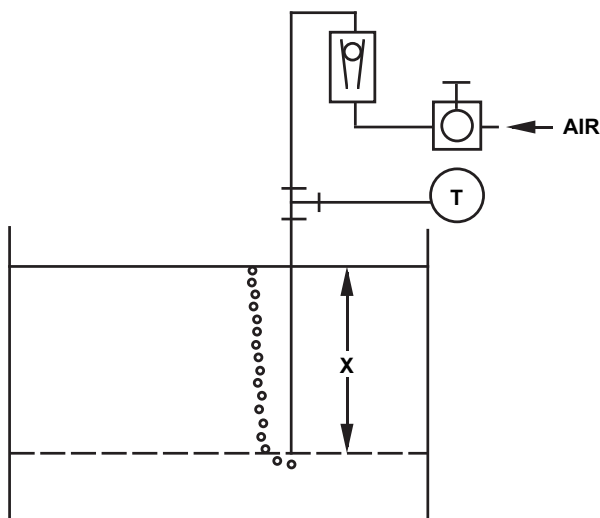


Bubbler System in Open Vessel

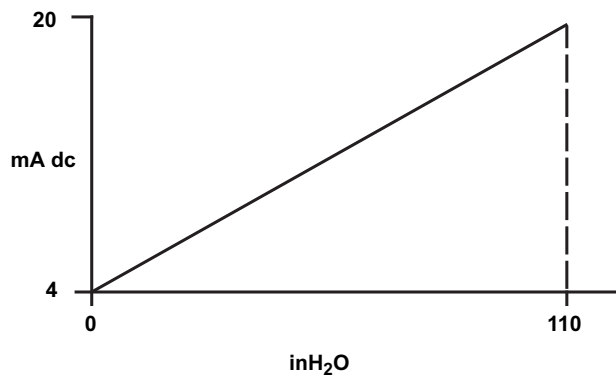
A bubbler system that has a top-mounted pressure transmitter can be used in open vessels. This system consists of an air supply, pressure regulator, constant flow meter, pressure transmitter, and a tube that extends down into the vessel.

Bubble air through the tube at a constant flow rate. The pressure required to maintain flow equals the liquid's specific gravity multiplied by the vertical height of the liquid above the tube opening. Figure 2-21 shows a bubbler liquid level measurement example.

Figure 2-21. Bubbler Liquid Level Measurement Example.



Let **X** equal the vertical distance between the minimum and maximum measurable levels (100 in.).
Let **SG** equal the specific gravity of the fluid (1.1).
Let **h** equal the maximum head pressure to be measured in inches of water.
Let **Range** equal **zero** to **h**.
Then $h = (X)(SG)$
 $= 100 \times 1.1$
 $= 110 \text{ inH}_2\text{O}$
Range = 0 to 110 inH₂O



Section 3 Configuration

Overview	page 3-1
Safety Messages	page 3-1
Device Capabilities	page 3-2
General Block Information	page 3-2
Resource Block	page 3-3
Analog Input (AI) Function Block	page 3-5
LCD Block	page 3-11

OVERVIEW

This section covers basic operation, software functionality, and basic configuration procedures for the Rosemount 2051 pressure transmitter with FOUNDATION fieldbus. This section is organized by block information. For detailed information about the function blocks used in the Rosemount 2051 Pressure Transmitter, refer to "Foundation Fieldbus Block Information" in the FOUNDATION fieldbus Block manual (00809-0100-4783).

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings

WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is live.
- Transmitter covers must be fully engaged to meet explosion proof requirements.
- Before connecting a configuration tool in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

WARNING

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

DEVICE CAPABILITIES

Link Active Scheduler

The Rosemount 2051 can be designated to act as the backup Link Active Scheduler (LAS) in the event that the LAS is disconnected from the segment. As the backup LAS, the 2051 will take over the management of communications until the host is restored.

The host system may provide a configuration tool specifically designed to designate a particular device as a backup LAS.

Capabilities

Block Execution times

Analog Input = 30 ms
PID = 45 ms

GENERAL BLOCK INFORMATION

Modes

The Resource, Transducer, and all function blocks in the device have modes of operation. These modes govern the operation of the block. Every block supports both automatic (AUTO) and out of service (OOS) modes. Other modes may also be supported.

Changing Modes

To change the operating mode, set the `MODE_BLK.TARGET` to the desired mode. After a short delay, the parameter `MODE_BLOCK.ACTUAL` should reflect the mode change if the block is operating properly.

Permitted Modes

It is possible to prevent unauthorized changes to the operating mode of a block. To do this, configure `MODE_BLOCK.PERMITTED` to allow only the desired operating modes. It is recommended to always select OOS as one of the permitted modes.

Types of Modes

For the procedures described in this manual, it will be helpful to understand the following modes:

AUTO

The functions performed by the block will execute. If the block has any outputs, these will continue to update. This is typically the normal operating mode.

Out of Service (OOS)

The functions performed by the block will not execute. If the block has any outputs, these will typically not update and the status of any values passed to downstream blocks will be "BAD". To make some changes to the configuration of the block, change the mode of the block to OOS. When the changes are complete, change the mode back to AUTO.

MAN

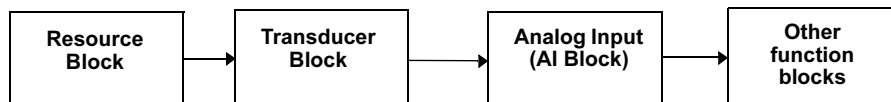
In this mode, variables that are passed out of the block can be manually set for testing or override purposes.

Other Types of Modes

Other types of modes are Cas, RCas, ROut, IMan and LO. Some of these may be supported by different function blocks in the Rosemount 2051. For more information, see the Function Block manual, document 00809-0100-4783.

NOTE

When an upstream block is set to OOS, this will impact the output status of all downstream blocks. The figure below depicts the hierarchy of blocks:



Simulation

Simulation is the functionality of the AI block. To support testing, either change the mode of the block to manual and adjust the output value or enable simulation through the configuration tool and manually enter a value for the measurement value and its status (this single value will apply to all outputs). In both cases, first set the ENABLE jumper on the field device.

NOTE

All fieldbus instruments have a simulation jumper. As a safety measure, the jumper has to be reset every time there is a power interruption. This measure is to prevent devices that went through simulation in the staging process from being installed with simulation enabled.

With simulation enabled, the actual measurement value has no impact on the OUT value or the status. The OUT values will all have the same value as determined by the simulate value.

RESOURCE BLOCK

FEATURES and FEATURES_SEL

The FEATURES parameter is read only and defines which features are supported by the 2051. Below is a list of the FEATURES the 2051 supports.

FEATURES_SEL is used to turn on any of the supported features that are found in the FEATURES parameter. The default setting of the Rosemount 2051 does not select any of these features. Choose one or more of the supported features if any.

UNICODE

All configurable string variables in the 2051, except tag names, are octet strings. Either ASCII or Unicode may be used. If the configuration device is generating Unicode octet strings, you must set the Unicode option bit.

REPORTS

The 2051 supports alert reports. The Reports option bit must be set in the features bit string to use this feature. If it is not set, the host must poll for alerts. If this bit is set, the transmitter will actively report alerts.

SOFTWARE LOCK and HARDWARE LOCK

Inputs to the security and write lock functions include the hardware security switch, the hardware and software write lock bits of the FEATURE_SEL parameter, the WRITE_LOCK parameter, and the DEFINE_WRITE_LOCK parameter.

The WRITE_LOCK parameter prevents modification of parameters within the device except to clear the WRITE_LOCK parameter. During this time, the block will function normally updating inputs and outputs and executing algorithms. When the WRITE_LOCK condition is cleared, a WRITE_ALM alert is generated with a priority that corresponds to the WRITE_PRI parameter.

The FEATURE_SEL parameter enables the user to select a hardware or software write lock or no write lock capability. To enable the hardware security function, enable the HW_SEL bit in the FEATURE_SEL parameter. When this bit has been enabled the WRITE_LOCK parameter becomes read only and will reflect the state of the hardware switch. In order to enable the software write lock, the SW_SEL bit must be set in the FEATURE_SEL parameter. Once this bit is set, the WRITE_LOCK parameter may be set to "Locked" or "Not Locked." Once the WRITE_LOCK parameter is set to "Locked" by either the software or the hardware lock, all user requested writes as determined by the DEFINE_WRITE_LOCK parameter shall be rejected.

The DEFINE_WRITE_LOCK parameter allows the user to configure whether the write lock functions (both software and hardware) will control writing to all blocks, or only to the resource and transducer blocks. Internally updated data such as process variables and diagnostics will not be restricted by the security switch.

The following table displays all possible configurations of the WRITE_LOCK parameter.

FEATURE_SEL HW_SEL bit	FEATURE_SEL SW_SEL bit	SECURITY SWITCH	WRITE_LOCK	WRITE_LOCK Read/Write	DEFINE_WRITE_LOCK	Write access to blocks
0 (off)	0 (off)	NA	1 (unlocked)	Read only	NA	All
0 (off)	1 (on)	NA	1 (unlocked)	Read/Write	NA	All
0 (off)	1 (on)	NA	2 (locked)	Read/Write	Physical	Function Blocks only
0 (off)	1 (on)	NA	2 (locked)	Read/Write	Everything	None
1 (on)	0 (off) ⁽¹⁾	0 (unlocked)	1 (unlocked)	Read only	NA	All
1 (on)	0 (off)	1 (locked)	2 (locked)	Read only	Physical	Function Blocks only
1 (on)	0 (off)	1 (locked)	2 (locked)	Read only	Everything	None

⁽¹⁾ The hardware and software write lock select bits are mutually exclusive and the hardware select has the highest priority. When the HW_SEL bit is set to 1 (on), the SW_SEL bit is automatically set to 0 (off) and is read only.

MAX_NOTIFY

The MAX_NOTIFY parameter value is the maximum number of alert reports that the resource can have sent without getting a confirmation, corresponding to the amount of buffer space available for alert messages. The number can be set lower, to control alert flooding, by adjusting the LIM_NOTIFY parameter value. If LIM_NOTIFY is set to zero, then no alerts are reported.

ANALOG INPUT (AI) FUNCTION BLOCK

Configure the AI block

⚠ A minimum of four parameters are required to configure the AI Block. The parameters are described below with example configurations shown at the end of this section.

CHANNEL

Select the channel that corresponds to the desired sensor measurement. The 2051 measures both pressure (channel 1) and sensor temperature (channel 2).

Table 3-1. I/O Channel Definitions

Channel Number	Channel Description
1	differential pressure in AI.XD_SCALE units
2	sensor temperature in AI.XD_SCALE units

L_TYPE

The L_TYPE parameter defines the relationship of the sensor measurement (pressure or sensor temperature) to the desired output of the AI Block (e.g. pressure, level, flow, etc.). The relationship can be direct, indirect, or indirect square root.

Direct

Select direct when the desired output will be the same as the sensor measurement (pressure or sensor temperature).

Indirect

Select indirect when the desired output is a calculated measurement based on the sensor measurement (e.g. a pressure measurement is made to determine level in a tank). The relationship between the sensor measurement and the calculated measurement will be linear.

Indirect Square Root

Select indirect square root when the desired output is an inferred measurement based on the sensor measurement and the relationship between the sensor measurement and the inferred measurement is square root (e.g. flow).

XD_SCALE and OUT_SCALE

The XD_SCALE and OUT_SCALE each include three parameters: 0%, 100%, and, engineering units. Set these based on the L_TYPE:

L_TYPE is Direct

When the desired output is the measured variable, set the XD_SCALE to the "Primary_Value_Range". This is found in the Sensor Transducer Block. Set OUT_SCALE to match XD_SCALE.

L_TYPE is Indirect

When an inferred measurement is made based on the sensor measurement, set the XD_SCALE to represent the operating range that the sensor will see in the process. Determine the inferred measurement values that correspond to the XD_SCALE 0 and 100% points and set these for the OUT_SCALE.

L_TYPE is Indirect Square Root

When an inferred measurement is made based on the sensor measurement AND the relationship between the inferred measurement and sensor measurement is square root, set the XD_SCALE to represent the operating range that the sensor will see in the process. Determine the inferred measurement values that correspond to the XD_SCALE 0 and 100% points and set these for the OUT_SCALE.:

Pressure (Channel 1)	Temperature (Channel 2)
Pa	°C
kPa	°F
bar	
mbar	
torr	
atm	
psi	
g/cm ²	
kg/cm ²	
inH ₂ O at 68 °F	
mmH ₂ O at 68 °F	
mmH ₂ O at 4 °F	
inHg at 0 °C	
mmHg at 0 °C	

NOTE

When the engineering units of the XD_SCALE are selected, this causes the engineering units of the PRIMARY_VALUE_RANGE in the Transducer Block to change to the same units. THIS IS THE ONLY WAY TO CHANGE THE ENGINEERING UNITS IN THE SENSOR TRANSDUCER BLOCK, PRIMARY_VALUE_RANGE parameter.

Configuration Examples**Pressure transmitter****Situation #1**

A pressure transmitter with a range of 0 – 100 psi.

Solution

Table 3-2 lists the appropriate configuration settings.

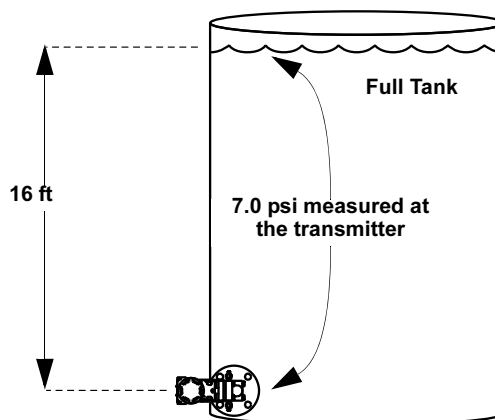
Table 3-2. Analog Input function block configuration for a typical pressure transmitter.

Parameter	Configured Values
L_TYPE	Direct
XD_SCALE	Primary_Value_Range
OUT_SCALE	Primary_Value_Range
Channel	1 - pressure

Pressure transmitter used to measure level in an open tank**Situation #2**

The level of an open tank is to be measured using a pressure tap at the bottom of the tank. The maximum level at the tank is 16 ft. The liquid in the tank has a density that makes the maximum level correspond to a pressure of 7.0 psi at the pressure tap (see Figure 3-1).

Figure 3-1. Situation #2
Diagram.



Solution to Situation #2

Table 3-3 lists the appropriate configuration settings.

Table 3-3. Analog Input function block configuration for a pressure transmitter used in level measurement (situation #1).

Parameter	Configured Values
L_TYPE	Indirect
XD_SCALE	0 to 7 psi
OUT_SCALE	0 to 16 ft
Channel	1 - pressure

Output calculation for Situation #2

When the L_Type is configured as Indirect, the OUT parameter is calculated as:

$$OUT = \frac{PV - XD_SCALE_0\%}{XD_SCALE_100\% - XD_SCALE_0\%} * (OUT_SCALE_100\% - OUT_SCALE_0\%) + OUT_SCALE_0\%$$

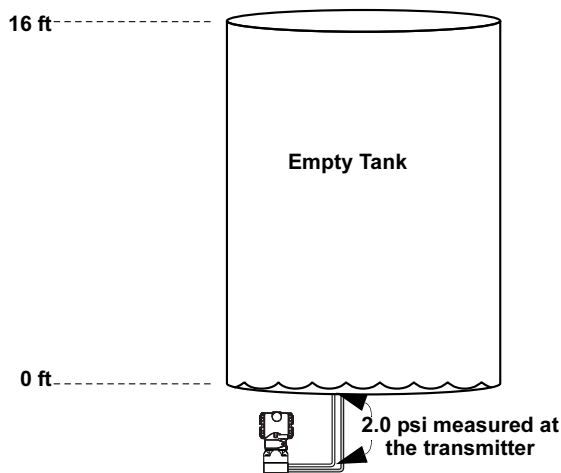
In this example, when PV is 5 psi, then the OUT parameter will be calculated as follows:

$$OUT = \frac{5 \text{ psi} - 0 \text{ psi}}{7 \text{ psi} - 0 \text{ psi}} * (16 \text{ ft.} - 0 \text{ ft.}) + 0 \text{ ft.} = 11.43 \text{ ft.}$$

Situation #3

The transmitter in situation #3 is installed below the tank in a position where the liquid column in the impulse line, with an empty tank, is equivalent to 2.0 psi (see Figure 3-2).

Figure 3-2. Situation #3 Diagram.



Solution to situation #3

Table 3-4 lists the appropriate configuration settings.

Table 3-4. Analog Input function block configuration for a pressure transmitter used in level measurement (Situation #3).

Parameter	Configured Values
L_TYPE	Indirect
XD_SCALE	2 to 9 psi
OUT_SCALE	0 to 16 ft
Channel	1 - pressure

In this example, when the PV is 4 psi, OUT will be calculated as follows:

$$OUT = \frac{4 \text{ psi} - 2 \text{ psi}}{9 \text{ psi} - 2 \text{ psi}} * (16 \text{ ft.} - 0 \text{ ft.}) + 0 \text{ ft.} = 4.57 \text{ ft.}$$

Differential pressure transmitter to measure flow

Situation #4

The liquid flow in a line is to be measured using the differential pressure across an orifice plate in the line. Based on the orifice specification sheet, the differential pressure transmitter was calibrated for 0 to 20 inH₂O for a flow of 0 to 800 gal/min.

Solution

Table 3-5 lists the appropriate configuration settings.

Table 3-5. Analog Input Function Block Configuration for a Differential Pressure Transmitter.

Parameter	Configured Values
L_TYPE	Indirect Square Root
XD_SCALE	0 to 20 in.H ₂ O
OUT_SCALE	0 to 800 gal/min.
Channel	1 - pressure

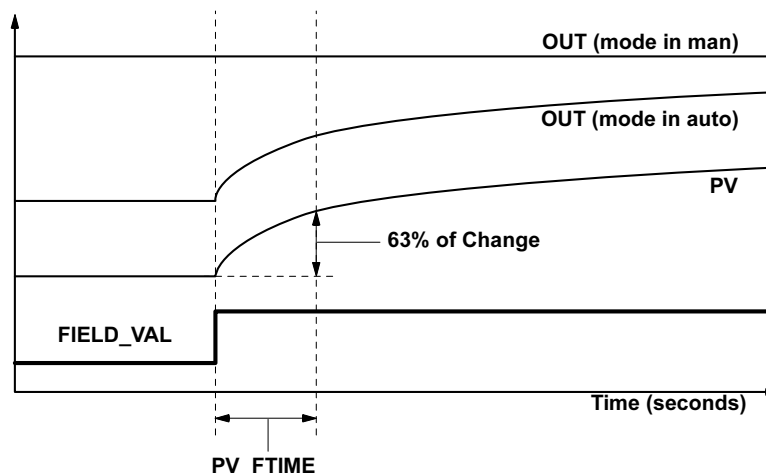
$$\text{Out} = \sqrt{\frac{\text{PV} - \text{XDSCALE0}}{\text{XDSCALE100}}} (\text{OUTSCALE100} - \text{OUTSCALE0}) + \text{OUTSCALE0}$$

$$\text{OUT} = \sqrt{\frac{8\text{inH}_2\text{O} - 0\text{inH}_2\text{O}}{20\text{inH}_2\text{O} - 0\text{inH}_2\text{O}}} (800\text{gal/min.} - 0\text{gal/min.}) + 0\text{gal/min.} = 505.96\text{gal/min.}$$

Filtering

⚠ The filtering feature changes the response time of the device to smooth variations in output readings caused by rapid changes in input. Adjust the filter time constant (in seconds) using the PV_FTIME parameter. Set the filter time constant to zero to disable the filter feature.

Figure 3-3. Analog Input PV_FTIME filtering Diagram.



Low Cutoff

⚠ When the converted input value is below the limit specified by the LOW_CUT parameter, and the Low Cutoff I/O option (IO_OPTS) is enabled (True), a value of zero is used for the converted value (PV). This option is useful to eliminate false readings when the differential pressure measurement is close to zero, and it may also be useful with zero-based measurement devices such as flowmeters.

NOTE

Low Cutoff is the only I/O option supported by the AI block. Set the I/O option in **Manual** or **Out of Service** mode only.

Process Alarms

Process Alarm detection is based on the OUT value. Configure the alarm limits of the following standard alarms:

- High (HI_LIM)
- High high (HI_HI_LIM)
- Low (LO_LIM)
- Low low (LO_LO_LIM)

In order to avoid alarm chattering when the variable is oscillating around the alarm limit, an alarm hysteresis in percent of the PV span can be set using the ALARM_HYS parameter. The priority of each alarm is set in the following parameters:

- HI_PRI
- HI_HI_PRI
- LO_PRI
- LO_LO_PRI

Alarm Priority

Alarms are grouped into five levels of priority:

Priority Number	Priority Description
0	The alarm condition is not used.
1	An alarm condition with a priority of 1 is recognized by the system, but is not reported to the operator.
2	An alarm condition with a priority of 2 is reported to the operator.
3-7	Alarm conditions of priority 3 to 7 are advisory alarms of increasing priority.
8-15	Alarm conditions of priority 8 to 15 are critical alarms of increasing priority.

Status Options

Status Options (STATUS_OPTS) supported by the AI block are shown below:

Propagate Fault Forward

If the status from the sensor is Bad, Device failure or Bad, Sensor failure, propagate it to OUT without generating an alarm. The use of these sub-status in OUT is determined by this option. Through this option, the user may determine whether alarming (sending of an alert) will be done by the block or propagated downstream for alarming.

Uncertain if Limited

Set the output status of the Analog Input block to uncertain if the measured or calculated value is limited.

BAD if Limited

Set the output status to Bad if the sensor is violating a high or low limit.

Uncertain if Man Mode

Set the output status of the Analog Input block to uncertain if the actual mode of the block is Man.

NOTES

The instrument must be in **Out of Service** mode to set the status option.

Advanced Features

The AI Function Block provides added capability through the addition of the following parameters:

ALARM_SEL

ALARM_SEL allows one or more of the process alarm conditions detected by the AI function block to be used in setting its OUT_D parameter.

OUT_D

OUT_D is the discrete output of the AI function block based on the detection of process alarm condition(s). This parameter may be linked to other function blocks that require a discrete input based on the detected alarm condition.

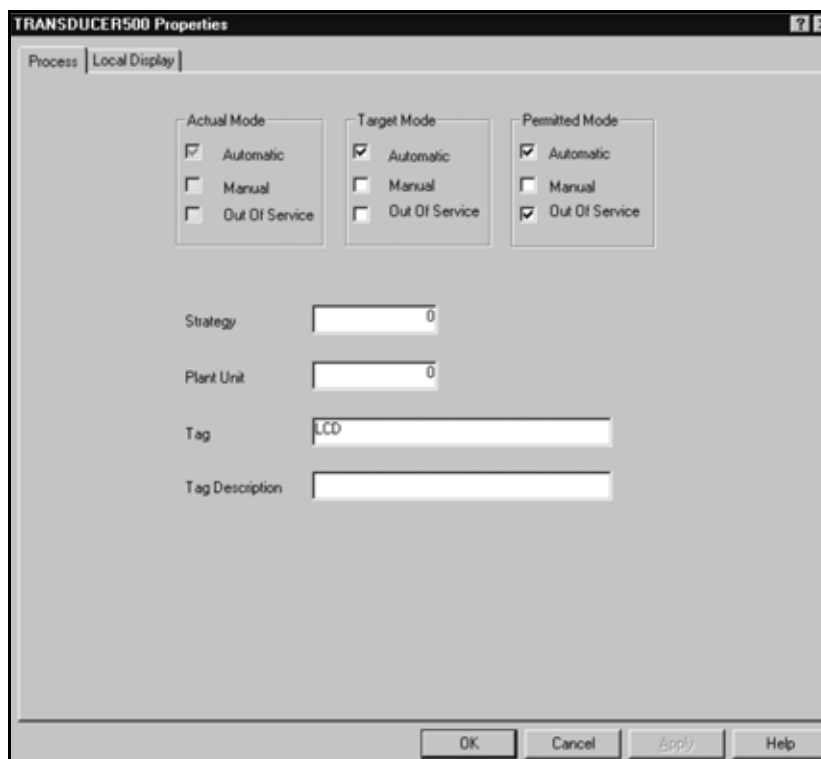
LCD BLOCK

The LCD can display up to four different parameters. If a parameter from a function block is displayed, then the function block must be scheduled (downloaded) in order for it to be displayed on the LCD. If a parameter from a different device is displayed, it must be linked to a block in the Rosemount 2051 transmitter with the LCD display and it must be downloaded. It can display any input or output parameter of any block in the Rosemount 2051. The first display is pre-configured to show the value of the transducer block of the Rosemount 2051. This value can be left or changed.

1. Open the LCD block by double clicking on the LCD transducer block in Deltav Explorer.

Figure 3-4 will appear. Make sure the block is in "Automatic" mode. Then select the "Local Display" tab.

Figure 3-4. Transducer500
Properties: Process Screen



For each parameter n(n =1 - 4) displayed on the LCD there are several fields in the "Local Display" tab that must be setup.

Figure 3-5. Transducer500
Properties Local Display Screen

The screenshot shows the 'TRANSUCER500 Properties' dialog box with the 'Local Display' tab selected. The 'Display Parameter Select' section at the top has checkboxes for 'Display Parameter 1' (checked), 'Display Parameter 2' (checked), 'Display Parameter 3' (unchecked), and 'Display Parameter 4' (unchecked). Below this, there are four sections for Parameter 1, Parameter 2, Parameter 3, and Parameter 4. Each section contains fields for Block Tag #n, Block Type #n, Units Type #n, Custom Tag #n, Param Index #n, and Custom Units #n. For Parameter 1, the values are: Block Tag #1: TRANSUCER, Block Type #1: Sensor Transducer Block, Units Type #1: Auto, Custom Tag #1: (empty), Param Index #1: PRIMARY VALUE, Custom Units #1: (empty). Parameters 2, 3, and 4 have similar fields but are mostly empty or set to default values like 'Auto' for units type.

1. The first parameter is called "BLOCK TAG_n," here you must enter the exact name of the block to be displayed. This must be the same name as the one that is stored in the device.
2. Then select "BLOCK TYPE_n". This is a drop down menu showing the selections available in the device. Select the desired block to be displayed, in the "BLK_TYPE_n" field.
3. Select "UNITS_TYPE_n". Select "Custom" in this parameter if bringing a value from outside the Rosemount 2051 device. "Auto" has only pressure units, which might or might not match the desired selection.
4. The next parameter is called "CUSTOM_TAG_n." This is an optional selection in identifying which parameter, block or device to be viewed on the LCD. This can be any name up to five characters long.
5. Then select "PARAM_INDEX_n". This is a drop down menu and the selections available in the device will appear. Select which parameter is to be displayed, in the "PARAM_INDEX_n" field.
6. Select "CUSTOM_UNITS_n" if "Custom" was selected previously in the "UNITS_TYPE_n" field above. This is limited to five characters and is where the desired units you wish to be displayed are entered.
7. To display more than one parameter be sure and check the appropriate number of boxes in the "Display Parameter Select" field.

Section 4 Operation and Maintenance

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Status	page 4-2
Calibration	page 4-3

OVERVIEW

This section contains information on operation and maintenance procedures.

METHODS AND MANUAL OPERATION

Each FOUNDATION fieldbus host or configuration tool has different ways of displaying and performing operations. Some hosts will use Device Descriptions (DD) and DD Methods to complete device configuration and will display data consistently across platforms. The DD can be found on Foundation's website at www.fieldbus.org. There is no requirement that a host or configuration tool support these features.

For DeltaV users, the DD can be found at www.easydeltav.com. The information in this section will describe how to use methods in a general fashion. In addition, if your host or configuration tool does not support methods this section will cover manually configuring the parameters involved with each method operation. For more detailed information on the use of methods, see your host or configuration tool manual.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings

⚠ WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is live.
- Transmitter covers must be fully engaged to meet explosion proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or nonincendive field wiring practices.

⚠ WARNING

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

⚠ WARNING

Performing a 'Restart with defaults' will set all function block information in the device to factory defaults. This includes the clearing of all function block links and schedule, as well as defaulting all Resource and Transducer Block user data.

STATUS

Along with the measured or calculated PV value, every FOUNDATION Fieldbus block passes an additional parameter called STATUS. The PV and STATUS are passed from the Transducer Block to the Analog Input Block. The STATUS can be one of the following: GOOD, BAD, or UNCERTAIN. When there are no problems detected by the self-diagnostics of the block, the STATUS will be GOOD. If a problem occurs with the hardware in the device, or, the quality of the process variable is compromised for some reason, the STATUS will become either BAD or UNCERTAIN depending upon the nature of the problem. It is important that the Control Strategy that makes use of the Analog Input Block is configured to monitor the STATUS and take action where appropriate when the STATUS is no longer GOOD.

Master Reset Method

Resource Block

⚠ To perform a master reset, run the Master Reset Method. If your system does not support methods, manually configure the Resource Block parameters listed below.

1. Set the RESTART to one of the options below:

- Run - Default State
- Resource - Not Used



- Defaults - Sets all device parameters to FOUNDATION fieldbus default values
- Processor - Does a software reset of the CPU

Simulation

⚠ Simulate replaces the channel value coming from the Sensor Transducer Block. For testing purposes, it is possible to manually drive the output of the Analog Input Block to a desired value. There are two ways to do this.

Manual Mode

To change only the OUT_VALUE and not the OUT_STATUS of the AI Block, place the TARGET MODE of the block to MANUAL. Then, change the OUT_VALUE to the desired value.

Simulate

1. If the SIMULATE switch is in the OFF position, move it to the ON position. If the SIMULATE jumper is already in the ON position, you must move it to off and place it back in the ON position.

NOTE


As a safety measure, the switch must be reset every time power is interrupted to the device in order to enable SIMULATE. This prevents a device that is tested on the bench from getting installed in the process with SIMULATE still active.

2. To change both the OUT_VALUE and OUT_STATUS of the AI Block, set the TARGET MODE to AUTO.
3. Set SIMULATE_ENABLE_DISABLE to 'Active'.
4. Enter the desired SIMULATE_VALUE to change the OUT_VALUE and SIMULATE_STATUS_QUALITY to change the OUT_STATUS.
 - If errors occur when performing the above steps, be sure that the SIMULATE jumper has been reset after powering up the device.

CALIBRATION

Sensor Calibration, Upper and Lower Trim Methods

Sensor Transducer

 In order to calibrate the transmitter, run the Upper and Lower Trim Methods. If your system does not support methods, manually configure the Transducer Block parameters listed below.

1. Set MODE_BLK.TARGET to OOS
2. Set CAL_UNIT to supported engineering units in the Transducer Block
3. Apply physical pressure that corresponds to the lower calibration point and allow the pressure to stabilize. The pressure must be between the range limits defined in PRIMARY_VALUE_RANGE.
4. Set values of CAL_POINT_LO to correspond to the pressure applied to the sensor.
5. Apply pressure, upper cal point.
6. Set CAL_POINT_HI


NOTE

CAL_POINT_HI must be within PRIMARY_VALUE_RANGE and greater than CAL_POINT_LO + CAL_MIN_SPAN

7. Set SENSOR_CAL_DATE to the current date.
8. Set SENSOR_CAL_WHO to the person responsible for the calibration.
9. Set SENSOR_CAL_LOC to the calibration location.
10. Set SENSOR_CAL_METHOD to User Trim
11. Set MODE_BLK.TARGET to AUTO

Sensor Calibration, Zero Trim Method


Sensor Transducer Block

 In order to zero the transmitter, run the Zero Trim Method. If your system does not support methods, manually configure the Transducer Block parameters listed below.

1. Set MODE_BLK.TARGET to OOS
2. Apply zero pressure to the sensor and allow the to reading stabilize
3. Set values CAL_POINT_LO to 0
4. Set SENSOR_CAL_DATE to the current date.
5. Set SENSOR_CAL_WHO to the person responsible for the calibration.
6. Set SENSOR_CAL_LOC to the calibration location.
7. Set SENSOR_CAL_METHOD to User Trim
8. Set MODE_BLK.TARGET to AUTO

Factory Calibration Method

Sensor Transducer Block

 To perform a factory trim on the transmitter, run the Factory Calibration Method. If your system does not support methods, manually configure the Transducer Block parameters listed below.

1. Set MODE_BLK.TARGET to OOS
2. Set FACTORY_CAL_RECALL to Recall
3. Set SENSOR_CAL_DATE to the current date.
4. Set SENSOR_CAL_WHO to the person responsible for the calibration.
5. Set SENSOR_CAL_LOC to the calibration location.
6. Set SENSOR_CAL_METHOD to Factory Trim
7. Set MODE_BLK.TARGET to AUTO

Section 5 Troubleshooting

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Analog Input (AI) Function Block	page 5-7
LCD Transducer block	page 5-7
Disassembly Procedures	page 5-9
Reassembly Procedures	page 5-11

OVERVIEW

This section provides summarized troubleshooting suggestions for the most common operating problems. Also included are disassembly and reassembly procedures.

Follow the procedures described here to verify that transmitter hardware and process connections are in good working order. Always deal with the most likely checkpoints first.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings

WARNING

Explosions can result in death or serious injury.

- Do not remove the transmitter covers in explosive environments when the circuit is live.
- Transmitter covers must be fully engaged to meet explosion proof requirements.
- Before connecting a communicator in an explosive atmosphere, make sure that the instruments in the loop are installed according to intrinsically safe or nonincendive field wiring practices.

CAUTION

Static electricity can damage sensitive components.

- Observe safe handling precautions for static-sensitive components.

TROUBLESHOOTING GUIDES

Figure 5-1. Rosemount 2051 troubleshooting flowchart

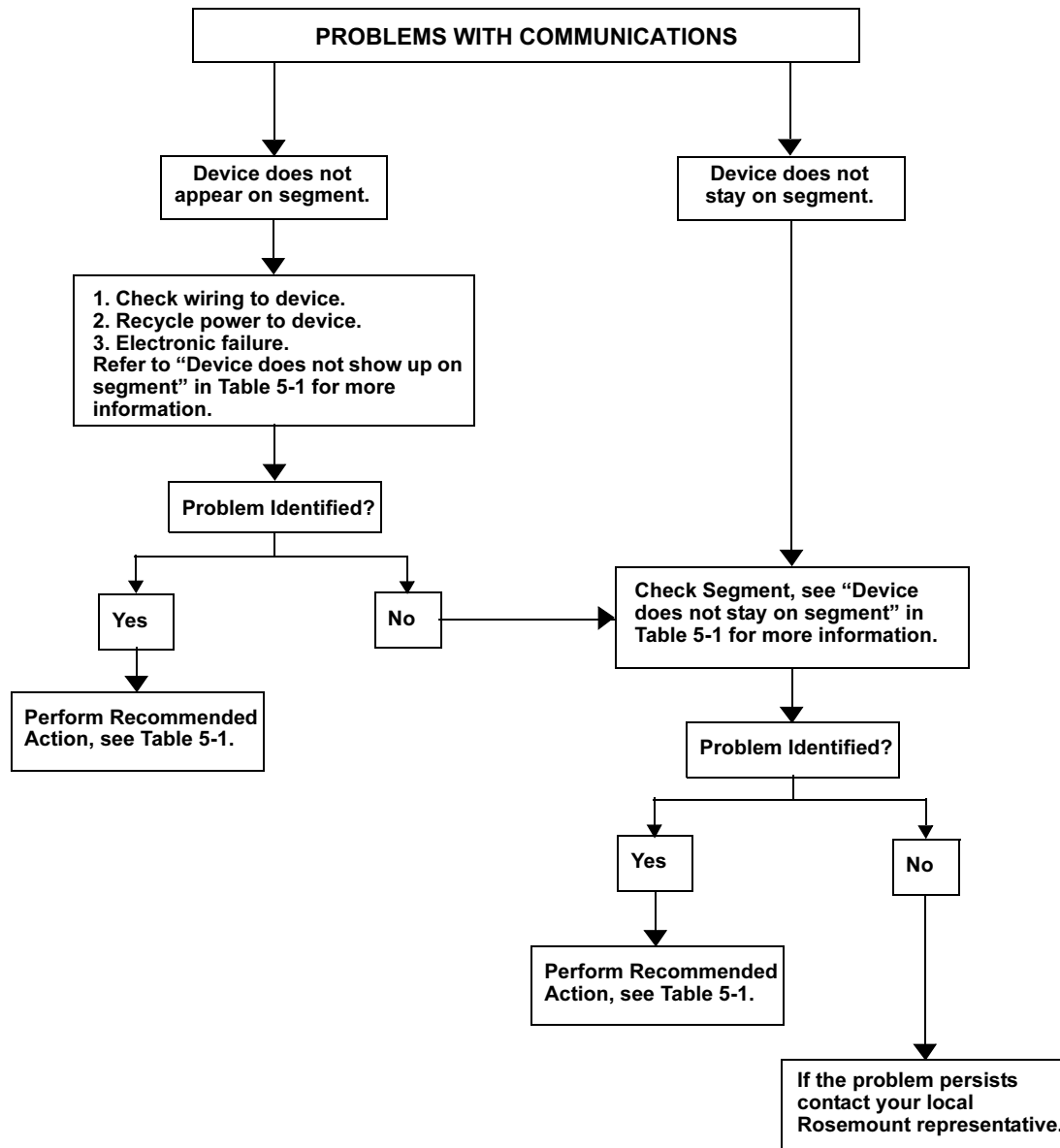


Figure 5-2. Problems with communications flowchart

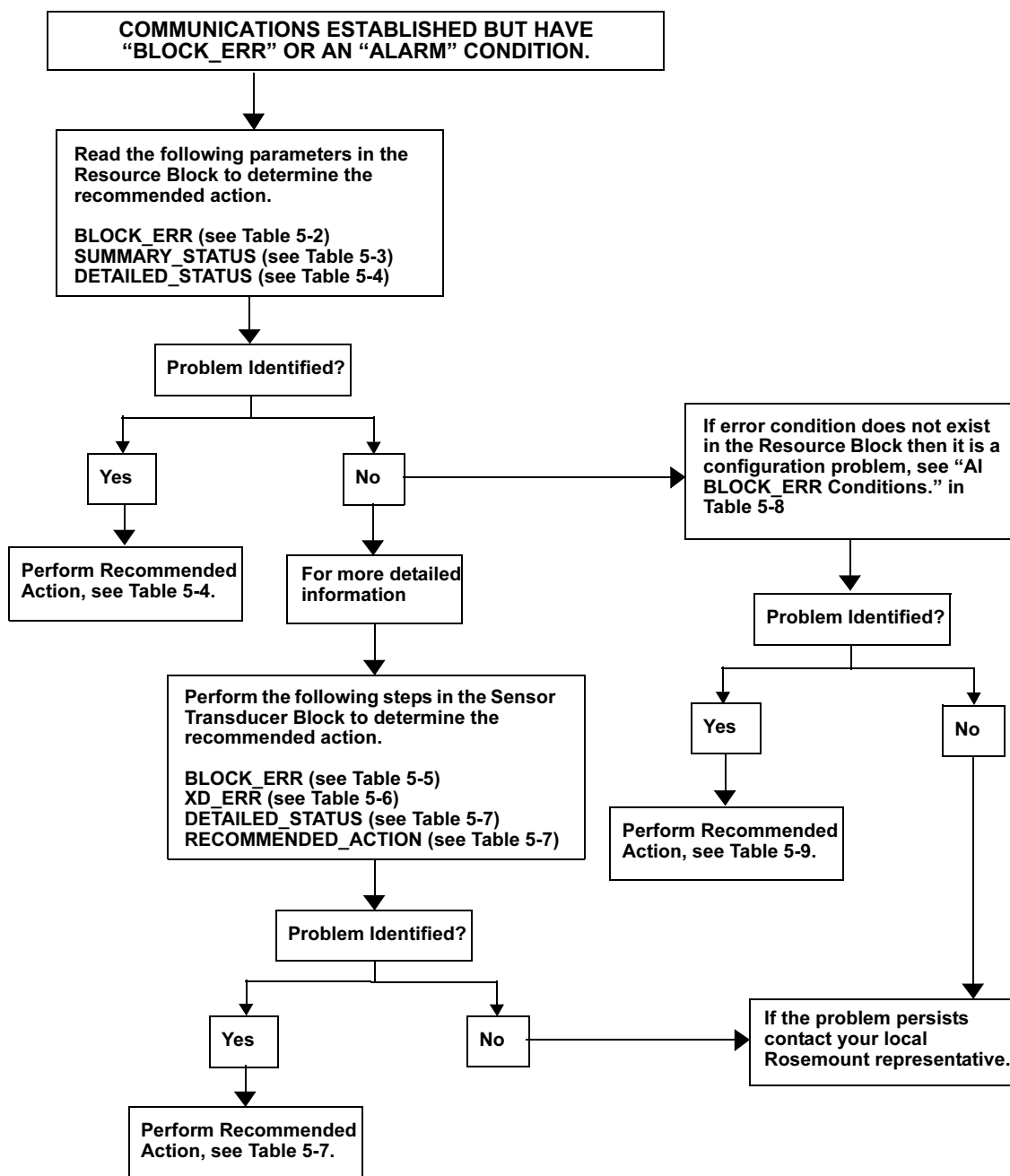


Table 5-1. Troubleshooting guide

Symptom ⁽¹⁾	Cause	Recommended Actions
Device does not show up on segment	Unknown	Recycle power to device
	No power to device	1. Ensure the device is connected to the segment. 2. Check voltage at terminals. There should be 9–32Vdc. 3. Check to ensure the device is drawing current. There should be approximately 17 mA.
	Segment problems	
	Electronics failing	1. Electronics board loose in housing. 2. Replace electronics.
Device does not stay on segment ⁽²⁾	Incompatible network settings	Change host network parameters. Refer to host documentation for procedure.
	Incorrect signal levels. Refer to host documentation for procedure.	1. Check for two terminators. 2. Excess cable length. 3. Bad Power supply or conditioner
	Excess noise on segment. Refer to host documentation for procedure.	1. Check for incorrect grounding. 2. Check for correct shielded wire. 3. Tighten wire connections. 4. Check for corrosion or moisture on terminals. 5. Check for Bad power supply.
	Electronics failing	1. Tighten electronics board. 2. Replace electronics.
	Other	1. Check for water in the terminal housing.

(1) The corrective actions should be done with consultation of your system integrator.

(2) Wiring and installation 31.25 kbit/s, voltage mode, wire medium application guide AG-140 available from the fieldbus Foundation.

RESOURCE BLOCK

This section describes error conditions found in the Resource block. Read Table 5-2 through Table 5-4 to determine the appropriate corrective action.

Table 5-2. Resource Block
BLOCK_ERR messages

Block Errors

Table 5-2 lists conditions reported in the BLOCK_ERR parameter.

Condition Name and Description
Other
Simulate Active: This indicates that the simulation switch is in place. This is not an indication that the I/O blocks are using simulated data.
Device Fault State Set
Device Needs Maintenance Soon
Memory Failure: A memory failure has occurred in FLASH, RAM, or EEPROM memory
Lost Static Data: Static data that is stored in non-volatile memory has been lost.
Lost NV Data: Non-volatile data that is stored in non-volatile memory has been lost.
Device Needs Maintenance Now
Out of Service: The actual mode is out of service.

Table 5-3. Resource Block
SUMMARY_STATUS messages

Condition Name
Uninitialized
No repair needed
Repairable
Call Service Center

Table 5-4. Resource Block
DETAILED_STATUS with
recommended action messages

Condition Name	Recommended Action
LOI Transducer block error	1. Restart processor 2. Check display connection 3. Call service center
Sensor Transducer block error.	1. Restart processor 2. Check sensor module cable 3. Call service center
Mfg. Block integrity error	1. Restart processor 2. Call service center
Non-Volatile memory integrity error	1. Restart processor 2. Call service center
ROM integrity error	1. Restart processor 2. Call service center

SENSOR TRANSDUCER BLOCK

This section describes error conditions found in the Sensor Transducer Block. Read Table 5-5 through Table 5-7 to determine the appropriate corrective action.

Table 5-5. Sensor Transducer Block BLOCK_ERR messages

Condition Name and Description
Other
Out of Service: The actual mode is out of service.

Table 5-6. Sensor Transducer Block XD_ERR messages

Condition Name and Description
Electronics Failure: An electrical component failed.
I/O Failure: An I/O failure occurred.
Data Integrity Error: Data stored in the device is no longer valid due to a non-volatile memory checksum failure, a data verify after write failure, etc.
Algorithm Error: The algorithm used in the transducer block produced an error due to overflow, data reasonableness failure, etc.

Diagnostics

Table 5-7 lists the potential errors and the possible corrective actions for the given values. The corrective actions are in order of increasing system level compromises. The first step should always be to reset the transmitter and then if the error persists, try the steps in Table 5-7. Start with the first corrective action and then try the second.

Table 5-7. Sensor Transducer Block DETAILED_XD_STATUS and RECOMMENDED_ACTION messages

Condition Name and Description	RECOMMENDED_ACTION
Pressure sensor not updating	1. Restart Processor 2. Reconnect sensor module cable 3. Send to Service Center
Temperature sensor not updating	1. Restart Processor 2. Reconnect sensor module cable 3. Send to Service Center
Sensor ROM Check sum failure	1. Restart Processor 2. Send to Service Center
Sensor NV write failure	1. Restart Processor 2. Send to Service Center
Sensor RAM check sum error	1. Restart Processor 2. Send to Service Center
Sensor NV factory data warning	1. Restart Processor 2. Send to Service Center
Sensor NV user data warning	1. Restart Processor 2. Send to Service Center
Sensor NV user data error	1. Restart Processor 2. Send to Service Center
Sensor NV factory data error	1. Restart Processor 2. Send to Service Center
Pressure sensor out of limits	1. Check pressure 2. Restart Processor
Sensor temperature out of limits	1. Check Temperature 2. Restart Processor
Sensor temperature beyond failure limits	1. Check Temperature 2. Restart Processor 3. Send to Service Center

ANALOG INPUT (AI) FUNCTION BLOCK

This section describes error conditions that are supported by the AI Block. Read Table 5-9 to determine the appropriate corrective action.

Table 5-8. AI BLOCK_ERR Conditions.

Condition Number	Condition Name and Description
0	Other
1	Block Configuration Error: the selected channel carries a measurement that is incompatible with the engineering units selected in XD_SCALE, the L_TYPE parameter is not configured, or CHANNEL = zero.
3	Simulate Active: Simulation is enabled and the block is using a simulated value in its execution.
7	Input Failure/Process Variable has Bad Status: The hardware is bad, or a bad status is being simulated.
14	Power Up
15	Out of Service: The actual mode is out of service.

Table 5-9. Troubleshooting the AI block

Symptom	Possible Causes	Recommended Actions
Bad or no pressure readings (Read the AI "BLOCK_ERR" parameter)	BLOCK_ERR reads OUT OF SERVICE (OOS)	1. AI Block target mode target mode set to OOS. 2. Resource Block OUT OF SERVICE.
	BLOCK_ERR reads CONFIGURATION ERROR	1. Check CHANNEL parameter (see "CHANNEL" on page 3-9) 2. Check L_TYPE parameter (see "L_TYPE" on page 3-9) 3. Check XD_SCALE engineering units. (see "XD_SCALE and OUT_SCALE" on page 3-10)
	BLOCK_ERR reads POWERUP	Download Schedule into block. Refer to host for downloading procedure.
	BLOCK_ERR reads BAD INPUT	1. Sensor Transducer Block Out Of Service (OOS) 2. Resource Block Out of Service (OOS)
	No BLOCK_ERR but readings are not correct. If using Indirect mode, scaling could be wrong.	1. Check XD_SCALE parameter. 2. Check OUT_SCALE parameter. (see "XD_SCALE and OUT_SCALE" on page 3-10)
	No BLOCK_ERR. Sensor needs to be calibrated or Zero trimmed.	See Section 3: Operation and Maintenance to determine the appropriate trimming or calibration procedure.
OUT parameter status reads UNCERTAIN and substatus reads EngUnitRangViolation.	Out_ScaleEU_0 and EU_100 settings are incorrect.	See "XD_SCALE and OUT_SCALE" on page 3-10.

LCD TRANSDUCER BLOCK

This section describes error conditions found in the LCD Transducer Block. Read Table 5-10 and to determine the appropriate corrective action.

Self Test Procedure for the LCD

The SELF_TEST parameter in the Resource block will test LCD segments. When running, the segments of the display should light up for about five seconds.

If your host system supports methods refer to your host documentation on how to run the "Self Test" method. If your host system does not support methods than you can run this test manually be following the steps below.

1. Put Resource block into "OOS" (Out of Service).
2. Go to the parameter called "SELF_TEST" and write the value Self test (0x2).
3. Observe the LCD screen when you are doing this. All of the segments should light up.
4. Put the Resource block back into "AUTO".

Table 5-10. LCD Transducer Block BLOCK_ERR messages

Condition Name and Description

Other

Out of Service: The actual mode is out of service.

Symptom	Possible Causes	Recommended Action
The LCD displays "DSPLY#INVALID." Read the BLOCK_ERR and if it says "BLOCK CONFIGURATION" perform the Recommended Action	One or more of the display parameters are not configured properly.	See "LCD Transducer Block" on page 2-16.
"2051" is being displayed or not all of the values are being displayed.	The LCD block parameter "DISPLAY_PARAMETER_SELECT is not properly configured.	See "LCD Transducer Block" on page 2-16.
The display reads OOS	The resource and or the LCD Transducer block are OOS.	Verify that both blocks are in "AUTO,"
The display is hard to read.	Some of the LCD segments may have gone bad. Device is out o the temperature limit for the LCD. (-20 to 80 °C)	See XXXX (Self Test). If some of the segment is bad, replace the LCD. Check ambient temperature of the device.

DISASSEMBLY PROCEDURES



Do not remove the instrument cover in explosive atmospheres when the circuit is live.

Remove from Service

Follow these steps:

- Follow all plant safety rules and procedures.
- Isolate and vent the process from the transmitter before removing the transmitter from service.
- Remove all electrical leads and disconnect conduit.
- Remove the transmitter from the process connection.
 - The Rosemount 2051C transmitter is attached to the process connection by four bolts and two cap screws. Remove the bolts and separate the transmitter from the process connection. Leave the process connection in place and ready for re-installation.
 - The Rosemount 2051T transmitter is attached to the process by a single hex nut process connection. Loosen the hex nut to separate the transmitter from the process. Do not wrench on neck of transmitter.
- Do not scratch, puncture, or depress the isolating diaphragms.
- Clean isolating diaphragms with a soft rag and a mild cleaning solution, and rinse with clear water.
- For the 2051C, whenever you remove the process flange or flange adapters, visually inspect the PTFE o-rings. Replace the o-rings if they show any signs of damage, such as nicks or cuts. Undamaged o-rings may be reused.

Remove Terminal Block

Electrical connections are located on the terminal block in the compartment labeled "FIELD TERMINALS."


1. Remove the housing cover from the field terminal side.
2. Loosen the two small screws located on the assembly in the 9 o'clock and 3 o'clock positions.
3. Pull the entire terminal block out to remove it.



See "Safety Messages" on page 5-1 for complete warning information.

Remove the Electronics Board

The transmitter electronics board is located in the compartment opposite the terminal side. To remove the electronics board perform the following procedure:

1. Remove the housing cover opposite the field terminal side.
2. If you are disassembling a transmitter with a LCD display, loosen the two captive screws that are visible on the right and left side of the meter display.
-  3. Loosen the two captive screws that anchor the board to the housing. The electronics board is electrostatically sensitive; observe handling precautions for static-sensitive components. Use caution when removing the LCD as there is an electronic pin connector that interfaces between the LCD and electronics board. The two screws anchor the LCD display to the electronics board and the electronics board to the housing.
4. Using the two captive screws, slowly pull the electronics board out of the housing. The sensor module ribbon cable holds the electronics board to the housing. Disengage the ribbon cable by pushing the connector release.

Remove the Sensor Module from the Electronics Housing

1. Remove the electronics board. Refer to "Remove the Electronics Board" on page 5-10.

IMPORTANT

To prevent damage to the sensor module ribbon cable, disconnect it from the electronics board before you remove the sensor module from the electrical housing.

2. Carefully tuck the cable connector completely inside of the internal black cap.

NOTE

Do not remove the housing until after you tuck the cable connector completely inside of the internal black cap. The black cap protects the ribbon cable from damage that can occur when you rotate the housing.

3. Loosen the housing rotation set screw with a $\frac{5}{64}$ -inch hex wrench, and loosen one full turn.
4. Unscrew the module from the housing, making sure the black cap and sensor cable do not catch on the housing.

REASSEMBLY PROCEDURES

1. Inspect all cover and housing (non-process wetted) O-rings and replace if necessary. Lightly grease with silicone lubricant to ensure a good seal.
2. Carefully tuck the cable connector completely inside the internal black cap. To do so, turn the black cap and cable counterclockwise one rotation to tighten the cable.
3. Lower the electronics housing onto the module. Guide the internal black cap and cable through the housing and into the external black cap.
4. Turn the module clockwise into the housing.

IMPORTANT

Make sure the sensor ribbon cable and internal black cap remain completely free of the housing as you rotate it. Damage can occur to the cable if the internal black cap and ribbon cable become hung up and rotate with the housing.

Attach the Electronics Board

5. Thread the housing completely onto the sensor module. The housing must be no more than one full turn from flush with the sensor module to comply with explosion proof requirements.
6. Tighten the housing rotation set screw using a $\frac{5}{64}$ -inch hex wrench.
1. Remove the cable connector from its position inside of the internal black cap and attach it to the electronics board.
2. Using the two captive screws as handles, insert the electronics board into the housing. Make sure the posts from the electronics housing properly engage the receptacles on the electronics board. Do not force. The electronics board should slide gently on the connections.
3. Tighten the captive mounting screws.
4. Replace the electronics housing cover. The transmitter covers must be engaged metal-to-metal to ensure a proper seal and to meet Explosion-Proof requirements.

Install the Terminal Block

1. Gently slide the terminal block into place, making sure the two posts from the electronics housing properly engage the receptacles on the terminal block.
2. Tighten the captive screws.
3. Replace the electronics housing cover. The transmitter covers must be fully engaged to meet Explosion-Proof requirements.

Reassemble the 2051C Process Flange

1. Inspect the sensor module PTFE o-rings. Undamaged o-rings may be reused. Replace o-rings that show any signs of damage, such as nicks, cuts, or general wear.

NOTE

If you are replacing the o-rings, be careful not to scratch the o-ring grooves or the surface of the isolating diaphragm when removing the damaged o-rings.

2. Install the process connection. Possible options include:

- a. Coplanar Process Flange:
 - Hold the process flange in place by installing the two alignment screws to finger tightness (screws are not pressure retaining). Do not overtighten as this will affect module-to-flange alignment.
 - Install the four 1.75-in. flange bolts by finger tightening them to the flange.
 - b. Coplanar Process Flange with Flange Adapters:
 - Hold the process flange in place by installing the two alignment screws to finger tightness (screws are not pressure retaining). Do not overtighten as this will affect module-to-flange alignment.
 - Hold the flange adapters and adapter o-rings in place while installing the four configurations, use four 2.88-in. bolts. For gage pressure configurations, use two 2.88-in. bolts and two 1.75-in. bolts.
 - c. Manifold:
 - Contact the manifold manufacturer for the appropriate bolts and procedures.
3. Tighten the bolts to the initial torque value using a crossed pattern. See Table 5-11 for appropriate torque values.

Table 5-11. Bolt Installation Torque Values

Bolt Material	Initial Torque Value	Final Torque Value
CS-ASTM-A449 Standard	300 in.-lb. (34 N-m)	650 in.-lb. (73 N-m)
316 SST—Option L4	150 in.-lb. (17 N-m)	300 in.-lb. (34 N-m)
ASTM-A-193-B7M—Option L5	300 in.-lb. (34 N-m)	650 in.-lb. (73 N-m)
ASTM-A-193 Class 2, Grade B8M—Option L8	150 in.-lb. (17 N-m)	300 in.-lb. (34 N-m)

NOTE

If you replaced the PTFE sensor module o-rings, re-torque the flange bolts after installation to compensate for cold flow.

NOTE

After replacing o-rings on Range 1 transmitters and re-installing the process flange, expose the transmitter to a temperature of 185 °F (85 °C) for two hours. Then re-tighten the flange bolts in a cross pattern, and again expose the transmitter to a temperature of 185 °F (85 °C) for two hours before calibration.

Install the Drain/Vent Valve

1. Apply sealing tape to the threads on the seat. Starting at the base of the valve with the threaded end pointing toward the installer, apply two clockwise turns of sealing tape.
2. Tighten the drain/vent valve to 250 in.-lb. (28.25 N-m).
3. Take care to place the opening on the valve so that process fluid will drain toward the ground and away from human contact when the valve is opened.

Appendix A Reference Data

Performance Specifications	page A-1
Functional Specifications	page A-4
Physical Specifications	page A-9
Ordering Information	page A-12
Options	page A-22
Spare Parts	page A-25

PERFORMANCE SPECIFICATIONS

For zero based spans, reference conditions, silicone oil fill, SST materials, Coplanar flange (2051C) or 1/2 in. - 14 NPT (2051T) process connections, digital trim values range points. Applies to 4-20 mA HART output only unless otherwise noted.

Conformance To Specification ($\pm 3\sigma$ (Sigma))

Technology leadership, advanced manufacturing techniques and statistical process control ensure specification conformance to at least $\pm 3\sigma$.

Reference Accuracy⁽¹⁾

Models	Standard	Performance Option, P8
2051C		
Ranges 2-5	$\pm 0.075\%$ of span For spans less than 10:1, accuracy = $\pm \left[0.025 + 0.005 \left(\frac{URL}{Span} \right) \right] \% \text{ of Span}$	Ranges 2-5 High Accuracy Option, P8 $\pm 0.065\%$ of span For spans less than 10:1, accuracy = $\pm \left[0.015 + 0.005 \left(\frac{URL}{Span} \right) \right] \% \text{ of Span}$
Range 1	$\pm 0.10\%$ of span For spans less than 15:1, accuracy = $\pm \left[0.025 + 0.005 \left(\frac{URL}{Span} \right) \right] \% \text{ of Span}$	
2051T		
Ranges 1-4	$\pm 0.075\%$ of span For spans less than 10:1, accuracy = $\pm \left[0.0075 \left(\frac{URL}{Span} \right) \right] \% \text{ of Span}$	Ranges 1-4 High Accuracy Option, P8 $\pm 0.065\%$ of span For spans less than 10:1, accuracy = $\pm \left[0.0075 \left(\frac{URL}{Span} \right) \right] \% \text{ of Span}$
Range 5	$\pm 0.075\%$ of span for spans greater than 5:1	
2051L		
Ranges 2-4	$\pm 0.075\%$ of span For spans less than 10:1, accuracy = $\pm \left[0.025 + 0.005 \left(\frac{URL}{Span} \right) \right] \% \text{ of Span}$	

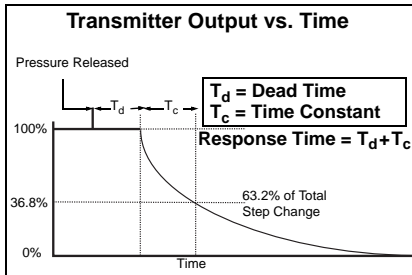
(1) For FOUNDATION fieldbus transmitters, use calibrated range in place of span.

Long Term Stability

Models	Standard	Performance Option, P8
2051C ⁽¹⁾	Ranges 2-5 ±0.1% of URL for 2 years	±0.125% of URL for 5 years
2051CD	Range 1 ±0.2% of URL for 1 year	
2051T ⁽¹⁾	Ranges 1-5 ±0.1% of URL for 2 years	±0.125% of URL for 5 years

(1) Measured at reference conditions after exposure to temperature changes of up to ±50 °F (28 °C), and line pressure changes up to 1000 psi (6,9 MPa).

Dynamic Performance

	4 - 20 mA HART ⁽¹⁾ 1-5 Vdc HART Lower Power ⁽¹⁾	Fieldbus ⁽³⁾	Typical HART Transmitter Response Time
Total Response Time ($T_d + T_c$)⁽²⁾:			
2051C, Range 3-5:	115 milliseconds	152 milliseconds	 <p>Transmitter Output vs. Time</p> <p>Pressure Released</p> <p>100%</p> <p>36.8%</p> <p>0%</p> <p>Time</p> <p>T_d = Dead Time T_c = Time Constant Response Time = $T_d + T_c$</p> <p>63.2% of Total Step Change</p>
Range 1:	270 milliseconds	307 milliseconds	
Range 2:	130 milliseconds	152 milliseconds	
2051T:	100 milliseconds	152 milliseconds	
2051L:	See <i>Instrument Toolkit</i> [®]	See <i>Instrument Toolkit</i>	
Dead Time (T_d)	60 milliseconds (nominal)	97 milliseconds	
Update Rate	22 times per second	22 times per second	

(1) Dead time and update rate apply to all models and ranges; analog output only

(2) Nominal total response time at 75 °F (24 °C) reference conditions.

(3) Transmitter fieldbus output only, segment macro-cycle not included.

Line Pressure Effect per 1000 psi (6,9 MPa)

For line pressures above 2000 psi (13,7 MPa) and Ranges 4-5, see user manual (Rosemount publication number 00809-0100-4101).

Models	Line Pressure Effect
2051CD	Zero Error ⁽¹⁾
Ranges 2-3	±0.1% of URL/1000 psi (68,9 bar) for line pressures from 0 to 2000 psi (0 to 13,7 MPa)
Range 1	±0.5% of URL/1000 psi (68,9 bar)
	Span Error
Ranges 2-3	±0.1% of reading/1000 psi (68,9 bar)
Range 1	±0.4% of reading/1000 psi (68,9 bar)

(1) Can be calibrated out at line pressure.

Ambient Temperature Effect per 50°F (28°C)

Models	Ambient Temperature Effect
2051C	<p>Ranges 2-5 $\pm(0.025\% \text{ URL} + 0.125\% \text{ span})$ from 1:1 to 5:1 $\pm(0.05\% \text{ URL} + 0.25\% \text{ span})$ from 5:1 to 100:1</p> <p>Range 1 $\pm(0.2\% \text{ URL} + 0.5\% \text{ span})$ from 1:1 to 50:1</p>
2051T	<p>Range 2-4 $\pm(0.05\% \text{ URL} + 0.25\% \text{ span})$ from 1:1 to 30:1 $\pm(0.07\% \text{ URL} + 0.25\% \text{ span})$ from 30:1 to 100:1</p> <p>Range 1 $\pm(0.05\% \text{ URL} + 0.25\% \text{ span})$ from 1:1 to 10:1 $\pm(0.10\% \text{ URL} + 0.25\% \text{ span})$ from 10:1 to 100:1</p> <p>Range 5 $\pm(0.2\% \text{ URL} + 0.3\% \text{ span})$</p>
2051L	See <i>Instrument Toolkit</i>

Mounting Position Effects

Models	Mounting Position Effects
2051C	Zero shifts up to $\pm 1.25 \text{ inH}_2\text{O}$ (3,1 mbar), which can be calibrated out. No span effect.
2051T	Zero shifts up to $\pm 2.5 \text{ inH}_2\text{O}$ (6,2 mbar), which can be calibrated out. No span effect.
2051L	With liquid level diaphragm in vertical plane, zero shift of up to $1 \text{ inH}_2\text{O}$ (2,49 mbar). With diaphragm in horizontal plane, zero shift of up to $5 \text{ inH}_2\text{O}$ (12,43 mbar) plus extension length on extended units. Zero shifts can be calibrated out. No span effect.

Vibration Effect

Less than $\pm 0.1\%$ of URL when tested per the requirements of IEC60770-1 field or pipeline with high vibration level (10-60 Hz 0.21mm displacement peak amplitude / 60-2000 Hz 3g).

Power Supply Effect

Less than $\pm 0.005\%$ of calibrated span per volt.

Electromagnetic Compatibility (EMC)

Meets all relevant requirements of EN 61326 and NAMUR NE-21.

Transient Protection (Option Code T1)

Meets IEEE C62.41, Category Location B
6 kV crest (0.5 μs - 100 kHz)
3 kV crest (8 \times 20 microseconds)
6 kV crest (1.2 \times 50 microseconds)

FUNCTIONAL SPECIFICATIONS

Range and Sensor Limits

Range	2051CD, 2051CG, 2051L					
	Minimum Span	Range and Sensor Limits				
		Upper (URL)	Lower (LRL)			
			2051C Differential	2051C Gage ⁽¹⁾	2051L Differential	2051L Gage ⁽¹⁾
1	0.5 inH ₂ O (1,2 mbar)	25 inH ₂ O (62,3 mbar)	–25 inH ₂ O (–62,1 mbar)	–25 inH ₂ O (–62,1 mbar)	N/A	N/A
2	2.5 inH ₂ O (6,2 mbar)	250 inH ₂ O (0,62 bar)	–250 inH ₂ O (–0,62 bar)	–250 inH ₂ O (–0,62 bar)	–250 inH ₂ O (–0,62 bar)	–250 inH ₂ O (–0,62 bar)
3	10 inH ₂ O (24,9 mbar)	1000 inH ₂ O (2,49 bar)	–1000 inH ₂ O (–2,49 bar)	–393 inH ₂ O (–979 mbar)	–1000 inH ₂ O (–2,49 bar)	–393 inH ₂ O (–979 mbar)
4	3 psi (0,207 bar)	300 psi (20,6 bar)	–300 psi (–20,6 bar)	–14.2 psig (–979 mbar)	–300 psi (–20,7 bar)	–14.2 psig (–979 mbar)
5	20 psi (1,38 bar)	2000 psi (137,9 bar)	–2000 psi (–137,9 bar)	–14.2 psig (–979 mbar)	N/A	N/A

(1) Assumes atmospheric pressure of 14.7 psig.

Range	2051T			
	Minimum Span	Range and Sensor Limits		
		Upper (URL)	Lower (LRL) (Abs)	Lower ⁽¹⁾ (LRL) (Gage)
1	0.3 psi (20,6 mbar)	30 psi (2,06 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
2	1.5 psi (0,103 bar)	150 psi (10,3 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
3	8 psi (0,55 bar)	800 psi (55,2 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
4	40 psi (2,76 bar)	4000 psi (275,8 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)
5	2000 psi (137,9 bar)	10000 psi (689,4 bar)	0 psia (0 bar)	–14.7 psig (–1,01 bar)

(1) Assumes atmospheric pressure of 14.7 psig.

Service

Liquid, gas, and vapor applications

Protocols

4–20 mA HART (Output Code A)

Output

Two-wire 4–20 mA, user-selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 10.5 to 42.4 V dc with no load.

Turn-On Time

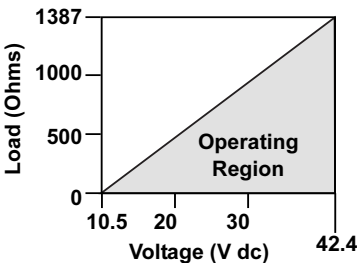
Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Load Limitations

Maximum loop resistance is determined by the voltage level of the external power supply, as described by:

Table A-1.

Maximum Loop Resistance = 43.5 * (Power Supply Voltage – 10.5)



The HART communicator requires a minimum loop resistance of 250Ω for communication.

FOUNDATION™ fieldbus (Output Code F)

Power Supply

External power supply required; transmitters operate on 9.0 to 32.0 V dc transmitter terminal voltage.

Current Draw

17.5 mA for all configurations (including LCD display option)

Turn-On Time

Performance within specifications less than 20.0 seconds after power is applied to the transmitter.

FOUNDATION fieldbus Function Block Execution Times

Block	Execution Time
Resource	-
Transducer	-
LCD Block	-
Analog Input 1, 2	30 milliseconds
PID	45 milliseconds

FOUNDATION fieldbus Parameters

Schedule Entries	7 (max.)
Links	20 (max.)
Virtual Communications Relationships (VCR)	12 (max.)

Standard Function Blocks

Resource Block

- Contains hardware, electronics, and diagnostic information.

Transducer Block

- Contains actual sensor measurement data including the sensor diagnostics and the ability to trim the pressure sensor or recall factory defaults.

LCD Block

- Configures the local display.

2 Analog Input Blocks

- Processes the measurements for input into other function blocks. The output value is in engineering units or custom and contains a status indicating measurement quality.

PID Block

- Contains all logic to perform PID control in the field including cascade and feedforward.

Backup Link Active Scheduler (LAS)

The transmitter can function as a Link Active Scheduler if the current link master device fails or is removed from the segment.

1-5 Vdc HART Low Power (Output Code M)

Output

Three wire 1–5 Vdc output, user-selectable for linear or square root output. Digital process variable superimposed on voltage signal, available to any host conforming to the *HART* protocol.

Power Supply

External power supply required. Standard transmitter operates on 9 to 28 Vdc with no load.

Power Consumption

3.0 mA, 27–84 mW

Output Load

100 k Ω or greater

Turn-On Time

Performance within specifications less than 2.0 seconds after power is applied to the transmitter.

Overpressure Limits

Transmitters withstand the following limits without damage:

2051C

- Ranges 2–5: 3626 psig (250 bar)
4500 psig (310,3 bar) for option code P9
- Range 1: 2000 psig (137,9 bar)

2051T

- Range 1: 750 psi (51,7 bar)
- Range 2: 1500 psi (103,4 bar)
- Range 3: 1600 psi (110,3 bar)
- Range 4: 6000 psi (413,7 bar)
- Range 5: 15000 psi (1034,2 bar)

2051L

Limit is flange rating or sensor rating, whichever is lower (see Table A-2).

Table A-2. 2051L Flange Rating

Standard	Type	CS Rating	SST Rating
ANSI/ASME	Class 150	285 psig	275 psig
ANSI/ASME	Class 300	740 psig	720 psig
<i>At 100 °F (38 °C), the rating decreases with increasing temperature.</i>			
DIN	PN 10–40	40 bar	40 bar
DIN	PN 10/16	16 bar	16 bar
<i>At 248 °F (120 °C), the rating decreases with increasing temperature.</i>			

Static Pressure Limit

2051CD

- Operates within specifications between static line pressures of -14.2 psig (0.034 bar) and 3626 psig (250 bar)
- For Option Code P9, 4500 psig (310,3 bar)
- Range 1: 0.5 psia to 2000 psig (34 mbar and 137,9 bar)

Burst Pressure Limits

2051C Coplanar or traditional process flange

- 10000 psig (689,5 bar)

2051T

- Ranges 1–4: 11000 psi (758,4 bar)
- Range 5: 26000 psi (1792,64 bar)

Temperature Limits

Ambient

–40 to 185 °F (–40 to 85 °C)

With LCD display⁽¹⁾: –40 to 175 °F (–40 to 80 °C)

Storage

–50 to 230 °F (–46 to 110 °C)

With LCD display: –40 to 185 °F (–40 to 85 °C)

⁽¹⁾ LCD display may not be readable and LCD updates will be slower at temperatures below –4 °F (–20 °C).

Process Temperature Limits

At atmospheric pressures and above.

Table A-3. 2051 Process Temperature Limits

2051C	
Silicone Fill Sensor ⁽¹⁾	
with Coplanar Flange	–40 to 250 °F (–40 to 121 °C) ⁽²⁾
with Traditional Flange	–40 to 300 °F (–40 to 149 °C) ⁽²⁾
with Level Flange	–40 to 300 °F (–40 to 149 °C) ⁽²⁾
with 305 Integral Manifold	–40 to 300 °F (–40 to 149 °C) ⁽²⁾
Inert Fill Sensor ⁽¹⁾	0 to 185 °F (–18 to 85 °C) ⁽³⁾
2051T (Process Fill Fluid)	
Silicone Fill Sensor ⁽¹⁾	–40 to 250 °F (–40 to 121 °C) ⁽²⁾
Inert Fill Sensor ⁽¹⁾	–22 to 250 °F (–30 to 121 °C) ⁽²⁾
2051L Low-Side Temperature Limits	
Silicone Fill Sensor ⁽¹⁾	–40 to 250 °F (–40 to 121 °C) ⁽²⁾

Table A-3. 2051 Process Temperature Limits

Inert Fill Sensor⁽¹⁾ 0 to 185 °F (–18 to 85 °C)⁽²⁾**2051L High-Side Temperature Limits (Process Fill Fluid)**

Syltherm® XLT –100 to 300 °F (–73 to 149 °C)

D.C. Silicone 704® 32 to 400 °F (0 to 205 °C)

D.C. Silicone 200 –40 to 400 °F (–40 to 205 °C)

Inert –50 to 350 °F (–45 to 177 °C)

Glycerin and Water 0 to 200 °F (–18 to 93 °C)

Neobee M-20® 0 to 400 °F (–18 to 205 °C)

Propylene Glycol and Water 0 to 200 °F (–18 to 93 °C)

(1) Process temperatures above 185 °F (85 °C) require derating the ambient limits by a 1.5:1 ratio.

(2) 220 °F (104 °C) limit in vacuum service; 130 °F (54 °C) for pressures below 0.5 psia.

(3) 160 °F (71 °C) limit in vacuum service.

Humidity Limits

0–100% relative humidity

Volumetric DisplacementLess than 0.005 in³ (0,08 cm³)**Damping**

Analog output response to a step input change is user-selectable from 0 to 25.6 seconds for one time constant. This software damping is in addition to sensor module response time.

Failure Mode Alarm

If self-diagnostics detect a sensor or microprocessor failure, the analog signal is driven either high or low to alert the user. High or low failure mode is user-selectable with a jumper on the transmitter. The values to which the transmitter drives its output in failure mode depend on whether it is factory-configured to *standard* or *NAMUR-compliant* operation. The values for each are as follows:

Standard Operation

Output Code	Linear Output	Fail High	Fail Low
A	$3.9 \leq I \leq 20.8$	$I \geq 21.75 \text{ mA}$	$I \leq 3.75 \text{ mA}$
M	$0.97 \leq V \leq 5.2$	$V \geq 5.4 \text{ V}$	$V \leq 0.95 \text{ V}$

NAMUR-Compliant Operation

Output Code	Linear Output	Fail High	Fail Low
A	$3.8 \leq I \leq 20.5$	$I \geq 22.5 \text{ mA}$	$I \leq 3.6 \text{ mA}$

Output Code F

If self-diagnostics detect a gross transmitter failure, that information gets passed as a status along with the process variable.

PHYSICAL SPECIFICATIONS

Electrical Connections

$\frac{1}{2}$ –14 NPT, G $\frac{1}{2}$, and M20 × 1.5 (CM20) conduit.

Process Connections

2051C

- $\frac{1}{4}$ –18 NPT on 2 $\frac{1}{8}$ -in. centers
- $\frac{1}{2}$ –14 NPT and RC $\frac{1}{2}$ on 2-in. (50.8mm), 2 $\frac{1}{8}$ -in. (54.0 mm), or 2 $\frac{1}{4}$ -in. (57.2mm) centers (process adapters)

2051T

- $\frac{1}{2}$ –14 NPT female
- G $\frac{1}{2}$ A DIN 16288 Male (available in SST for Range 1–4 transmitters only)
- Autoclave type F-250-C (Pressure relieved $\frac{9}{16}$ –18 gland thread; $\frac{1}{4}$ OD high pressure tube 60° cone; available in SST for Range 5 transmitters only)

2051L

- High pressure side: 2-in. (50.8mm), 3-in. (72 mm), or 4-in. (102mm), ASME B 16.5 (ANSI) Class 150 or 300 flange; 50, 80 or 100 mm, DIN 2501 PN 40 or 10/16 flange
- Low pressure side: $\frac{1}{4}$ –18 NPT on flange, $\frac{1}{2}$ –14 NPT on process adapter

2051C Process Wetted Parts

Drain/Vent Valves

316 SST or Alloy C-276

Process Flanges and Adapters

Plated carbon steel, SST CF-8M (cast version of 316 SST, material per ASTM-A743), or CW12MW (cast version of Alloy C-276)

Wetted O-rings

Glass-filled PTFE or Graphite-filled PTFE

Process Isolating Diaphragms

316L SST or Alloy C-276

2051T Process Wetted Parts

Process Connections

- 316L SST or Alloy C-276

Process Isolating Diaphragms

- 316L SST or Alloy C-276

2051L Process Wetted Parts

Flanged Process Connection (Transmitter High Side)

Process Diaphragms, Including Process Gasket Surface

- 316L SST or Alloy C-276

Extension

- CF-3M (Cast version of 316L SST, material per ASTM-A743), or Cast C-276. Fits schedule 40 and 80 pipe.

Mounting Flange

- Zinc-cobalt plated CS or SST

**Non-Wetted Parts for
2051C/T/L****Reference Process Connection (Transmitter Low Side)****Isolating Diaphragms**

- 316L SST or Alloy C-276

Reference Flange and Adapter

- CF-8M (Cast version of 316 SST, material per ASTM-A743)

Electronics Housing

Low-copper aluminum or CF-8M (Cast version of 316 SST). Enclosure Type 4X, IP 65, IP 66, IP68

Coplanar Sensor Module Housing

CF-3M (Cast version of 316L SST)

Bolts

ASTM A449, Type 1 (zinc-cobalt plated carbon steel)

ASTM F593G, Condition CW1 (Austenitic 316 SST)

ASTM A193, Grade B7M (zinc plated alloy steel)

Sensor Module Fill Fluid

Silicone oil (D.C. 200) or Fluorocarbon oil (Halocarbon or Fluorinert® FC-43 for 2051T)

Process Fill Fluid (2051L only)

Syltherm XLT, D.C. Silicone 704,

D.C. Silicone 200, inert, glycerin and water, Neobee M-20 or propylene glycol and water

Paint

Polyurethane

Cover O-rings

Buna-N

Shipping Weights

Table A-4. Transmitter Weights without Options

Transmitter	lb. (kg)
2051C	4.9 (2,2)
2051L	Table A-5 below
2051T	3.1 (1,4)

Table A-5. 2051L Weights without Options

Flange	Flush lb. (kg)	2-in. Ext. lb (kg)	4-in. Ext. lb (kg)	6-in. Ext. lb (kg)
2-in., 150	12.5 (5,7)	—	—	—
3-in., 150	17.5 (7,9)	19.5 (8,8)	20.5 (9,3)	21.5 (9,7)
4-in., 150	23.5 (10,7)	26.5 (12,0)	28.5 (12,9)	30.5 (13,8)
2-in., 300	17.5 (7,9)	—	—	—
3-in., 300	22.5 (10,2)	24.5 (11,1)	25.5 (11,6)	26.5 (12,0)
4-in., 300	32.5 (14,7)	35.5 (16,1)	37.5 (17,0)	39.5 (17,9)
DN 50/PN 40	13.8 (6,2)	—	—	—
DN 80/PN 40	19.5 (8,8)	21.5 (9,7)	22.5 (10,2)	23.5 (10,6)
DN 100/ PN 10/16	17.8 (8,1)	19.8 (9,0)	20.8 (9,5)	21.8 (9,9)
DN 100/ PN 40	23.2 (10,5)	25.2 (11,5)	26.2 (11,9)	27.2 (12,3)

Table A-6. Transmitter Options Weights

Code	Option	Add lb (kg)
J, K, L, M	Stainless Steel Housing	3.9 (1,8)
M5	LCD display for Aluminum Housing	0.5 (0,2)
B4	SST Mounting Bracket for <i>Coplanar</i> Flange	1.0 (0,5)
B1 B2 B3	Mounting Bracket for Traditional Flange	2.3 (1,0)
B7 B8 B9	Mounting Bracket for Traditional Flange	2.3 (1,0)
BA, BC	SST Bracket for Traditional Flange	2.3 (1,0)
H2	Traditional Flange	2.6 (1,2)
H3	Traditional Flange	3.0 (1,4)
H4	Traditional Flange	3.0 (1,4)
H7	Traditional Flange	2.7 (1,2)
FC	Level Flange—3 in., 150	12.7 (5,8)
FD	Level Flange—3 in., 300	15.9 (7,2)
FA	Level Flange—2 in., 150	8.0 (3,6)
FB	Level Flange—2 in., 300	8.4 (3,8)
FP	DIN Level Flange, SST, DN 50, PN 40	7.8 (3,5)
FQ	DIN Level Flange, SST, DN 80, PN 40	12.7 (5,8)

ORDERING INFORMATION

Model	Transmitter Type (Select One)		CD	CG	
2051C	Pressure Transmitter		•	•	
Model	Measurement Type		CD	CG	
D	Differential		•	—	
G	Gage		—	•	
Code	Pressure Ranges (Range/Min. Span)		CD	CG	
	2051CD	2051CG			
1	–25 to 25 inH ₂ O/0.5 inH ₂ O (–62,2 to 62,2 mbar/1,2 mbar)	–25 to 25 inH ₂ O/0.5 inH ₂ O (–62,1 to 62,2 mbar/1,2 mbar)	•	•	
2	–250 to 250 inH ₂ O/2.5 inH ₂ O (–623 to 623 mbar/6,2 mbar)	–250 to 250 inH ₂ O/2.5 inH ₂ O (–623 to 623 mbar/6,2 mbar)	•	•	
3	–1000 to 1000 inH ₂ O/10 inH ₂ O (–2,5 to 2,5 bar/25 mbar)	–393 to 1000 inH ₂ O/10 inH ₂ O (–0,98 to 2,5 bar/25 mbar)	•	•	
4	–300 to 300 psi/3 psi (–20,7 to 20,7 bar/0,2 bar)	–14.2 to 300 psi/3 psi (–0,98 to 20,7 bar/0,2 bar)	•	•	
5	–2000 to 2000 psi/20 psi (–137,9 to 137,9 bar/1,4 bar)	–14.2 to 2000 psig/20 psi (–0,98 to 137,9 bar/1,4 bar)	•	•	
Code	Output		CD	CG	
A	4–20 mA with Digital Signal Based on <i>HART</i> Protocol		•	•	
M	Low-Power, 1–5 V dc with Digital Signal Based on <i>HART</i> Protocol		•	•	
F	FOUNDATION fieldbus Protocol		•	•	
Code	Materials of Construction		CD	CG	
	Process Flange Type	Flange Material	Drain/Vent		
2	Coplanar	SST	SST	• •	
3 ⁽¹⁾	Coplanar	Cast C-276	Alloy C-276	• •	
5	Coplanar	Plated CS	SST	• •	
7 ⁽¹⁾	Coplanar	SST	Alloy C-276	• •	
8 ⁽¹⁾	Coplanar	Plated CS	Alloy C-276	• •	
0	Alternate Process Connection (Requires selecting Flange, Manifold, or Primary Element option code, see page A-13)		•	•	
Code	Isolating Diaphragm		CD	CG	
2 ⁽¹⁾	316L SST		•	•	
3 ⁽¹⁾	Alloy C-276		•	•	
Code	O-ring				
A	Glass-filled PTFE		•	•	
B	Graphite-filled PTFE		•	•	
Code	Fill Fluid		CD	CG	
1	Silicone		•	•	
2	Inert fill (Halocarbon)		•	•	
Code	Housing Material		Conduit Entry Size	CD	CG
A	Polyurethane-covered Aluminum		½–14 NPT	•	•
B	Polyurethane-covered Aluminum		M20 × 1.5 (CM20)	•	•
D	Polyurethane-covered Aluminum		G½	•	•
J	SST (consult factory for availability)		½–14 NPT	•	•
K	SST (consult factory for availability)		M20 × 1.5 (CM20)	•	•
M	SST (consult factory for availability)		G½	•	•

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Code	Options	CD	CG
Alternate Process Connection: Flange⁽²⁾			
H2	Traditional Flange, 316 SST, SST Drain/Vent	•	•
H3 ⁽¹⁾	Traditional Flange, Cast C-276, Alloy C-276 Drain/Vent	•	•
H7 ⁽¹⁾	Traditional Flange, 316 SST, Alloy C-276 Drain/Vent	•	•
HJ	DIN Compliant Traditional Flange, SST, 7/16 in. Adapter/Manifold Bolting	•	•
HK ⁽³⁾	DIN Compliant Traditional Flange, SST, 10 mm Adapter/Manifold Bolting	•	•
HL	DIN Compliant Traditional Flange, SST, 12mm Adapter/Manifold Bolting	•	•
FA	Level Flange, SST, 2 in., ANSI Class 150, Vertical Mount	•	•
FB	Level Flange, SST, 2 in., ANSI Class 300, Vertical Mount	•	•
FC	Level Flange, SST, 3 in., ANSI Class 150, Vertical Mount	•	•
FD	Level Flange, SST, 3 in., ANSI Class 300, Vertical Mount	•	•
FP	DIN Level Flange, SST, DN 50, PN 40, Vertical Mount	•	•
FQ	DIN Level Flange, SST, DN 80, PN 40, Vertical Mount	•	•
Alternate Process Connection: Manifold⁽²⁾⁽⁴⁾			
S5	Assemble to Rosemount 305 Integral Manifold	•	•
S6	Assemble to Rosemount 304 Manifold or Connection System	•	•
Alternate Process Connection: Primary Element⁽²⁾⁽⁴⁾			
S4 ⁽⁵⁾	Assemble to Rosemount Primary Element	•	—
S3	Assemble to Rosemount 405 Primary Element	•	—
Diaphragm Seal Assemblies⁽⁴⁾			
S1 ⁽⁶⁾	Assemble to one Rosemount 1199 diaphragm seal	•	•
S2 ⁽⁷⁾	Assemble to two Rosemount 1199 diaphragm seals	•	—
Mounting Brackets			
B1 ⁽⁸⁾	Traditional Flange Bracket for 2-in. Pipe Mounting, CS Bolts	•	•
B2 ⁽⁸⁾	Traditional Flange Bracket for Panel Mounting, CS Bolts	•	•
B3 ⁽⁸⁾	Traditional Flange Flat Bracket for 2-in. Pipe Mounting, CS Bolts	•	•
B4 ⁽⁹⁾	Coplanar Flange Bracket for 2-in. Pipe or Panel Mounting, all SST	•	•
B7 ⁽⁸⁾	B1 Bracket with Series 300 SST Bolts	•	•
B8 ⁽⁸⁾	B2 Bracket with Series 300 SST Bolts	•	•
B9 ⁽⁸⁾	B3 Bracket with Series 300 SST Bolts	•	•
BA ⁽⁸⁾	SST B1 Bracket with Series 300 SST Bolts	•	•
BC ⁽⁸⁾	SST B3 Bracket with Series 300 SST Bolts	•	•
Product Certifications			
E1 ⁽¹⁰⁾	ATEX Flameproof	•	•
E2 ⁽¹⁰⁾	INMETRO Flameproof (consult factory for availability)	•	•
E3 ⁽¹⁰⁾	China Flameproof (consult factory for availability)	•	•
E4 ⁽¹⁰⁾	TIIS Flameproof (consult factory for availability)	•	•
E5	FM Explosion-proof, Dust Ignition-proof	•	•
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	•	•
E7	IECEX Flameproof	•	•
EP ⁽¹⁰⁾	Korea (KOSHA) Flameproof Approval (consult factory for availability)	•	•
EW ⁽¹⁰⁾	India (CCOE) Flameproof Approval (consult factory for availability)	•	•
EM ⁽¹⁰⁾	GOST Explosion-proof (consult factory for availability)	•	•
I1	ATEX Intrinsic Safety	•	•
I2 ⁽¹⁰⁾	INMETRO Intrinsic Safety (consult factory for availability)	•	•
I3 ⁽¹⁰⁾	China Intrinsic Safety (consult factory for availability)	•	•
I4 ⁽¹⁰⁾	TIIS Intrinsic Safety (consult factory for availability)	•	•
I5	FM Intrinsically Safe, Division 2	•	•
I6	CSA Intrinsically Safe	•	•
I7 ⁽¹⁰⁾	IECEX Intrinsic Safety	•	•
IA ⁽¹¹⁾	ATEX FISCO Intrinsic Safety	•	•
IB ⁽¹¹⁾	INMETRO FISCO Intrinsic Safety (consult factory for availability)	•	•
ID ⁽¹¹⁾	TIIS FISCO Intrinsic Safety (consult factory for availability)	•	•
IE ⁽¹¹⁾	FM FISCO Intrinsically Safe	•	•

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IF ⁽¹¹⁾	CSA FISCO Intrinsically Safe	•	•
IG ⁽¹¹⁾	IECEX FISCO Intrinsically Safe	•	•
IP ⁽¹⁰⁾	Korea (KOSHA) Intrinsic Safety (consult factory for availability)	•	•
IM ⁽¹⁰⁾	GOST Intrinsically Safe (consult factory for availability)	•	•
IW ⁽¹⁰⁾	India (CCOE) Intrinsic Safety Approval (consult factory for availability)	•	•
K1 ⁽¹⁰⁾	ATEX Flameproof, Intrinsic Safety, Type n, Dust	•	•
K2 ⁽¹⁰⁾	INMETRO Flameproof, Intrinsic Safety, Type n (consult factory for availability)	•	•
K4 ⁽¹⁰⁾	TIIS Flameproof, Intrinsic Safety (consult factory for availability)	•	•
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	•	•
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	•	•
K7 ⁽¹⁰⁾	IECEX Flameproof, Intrinsic Safety, Type n	•	•
KA	ATEX and CSA Flameproof, Intrinsically Safe, Division 2	•	•
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2	•	•
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2	•	•
KD ⁽¹⁰⁾	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe	•	•
N1 ⁽¹⁰⁾	ATEX Type n	•	•
N7 ⁽¹⁰⁾	IECEX Type n	•	•
ND	ATEX Dust	•	•
Bolting Configurations		•	•
L4	Austenitic 316 SST Bolts	•	•
L5	ASTM A 193, Grade B7M Bolts	•	•
L8	ASTM A 193 Class 2, Grade B8M Bolts	•	•
Digital Display			
M5	LCD display	•	•
Special Configuration (Hardware)			
D4 ⁽¹²⁾	Zero and Span Hardware Adjustments	•	•
DF ⁽¹³⁾	1/2-14 NPT Flange Adapters	•	•
D9 ⁽¹⁴⁾	JIS Process Connection-RC 1/4 Flange with RC 1/2 Flange Adapter	•	•
V5 ⁽¹⁵⁾	External Ground Screw Assembly	•	•
Performance			
P8 ⁽¹⁶⁾	0.065% accuracy and 5 year stability	•	•
Terminal Blocks			
T1	Transient Protection Terminal Block	•	•
Special Configuration (Software)			
C1 ⁽¹⁷⁾	Custom Software Configuration (Requires completed Configuration Data Sheet)	•	•
C4 ⁽¹⁷⁾⁽¹⁸⁾	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High	•	•
CN ⁽¹⁷⁾⁽¹⁸⁾	Analog Output Levels Compliant with NAMUR Recommendation NE 43 Alarm Low	•	•
Special Procedures			
P1	Hydrostatic Testing with Certificate	•	•
P2 ⁽¹⁹⁾	Cleaning for Special Service	•	•
P9	4500 psig (310 bar) static pressure limit (Ranges 2-5 only)	•	•
P3 ⁽¹⁹⁾	Cleaning for <1 PPM Chlorine/Fluorine	•	•
Special Certifications			
Q4	Calibration Certificate	•	•
Q8	Material Traceability Certification per EN 10204 3.1.B	•	•
QS ⁽¹⁷⁾	Prior-use certificate of FMEDA data	•	•
Q16 ⁽²⁰⁾	Surface finish certification for sanitary remote seals	•	•
QP	Calibration certification and tamper evident seal	•	•
QZ ⁽²⁰⁾	Remote Seal System Performance Calculation Report	•	•
Typical Model Number: 2051C D 2 A 2 2 A 1 A B4 M5			

- (1) Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.
- (2) Requires 0 code in Materials of Construction for Alternate Process Connection.
- (3) Not valid with optional code P9 for 4500psi Static Pressure.
- (4) "Assemble-to" items are specified separately and require a completed model number.
- (5) Process Flange limited to Coplanar (codes 2, 3, 5, 7, 8) or Traditional (H2, H3, H7).

- (6) Not valid with optional code D9 for RC1/2 Adaptors.
- (7) Not valid with optional codes DF & D9 for Adaptors.
- (8) Requires option in the Alternate Process Connection: Flange section.
- (9) Requires Coplanar flange.
- (10) Not available with Low Power output code M.
- (11) Only valid with FOUNDATION fieldbus output code F.
- (12) Not available with FOUNDATION fieldbus output code F.
- (13) Not valid with Alternate Process Connection options S3, S4, S5, S6.
- (14) Not available with Alternate Process Connection: DIN Flanges and Level Flanges.
- (15) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.
- (16) Available for HART 4-20mA output code A. Valid for Ranges 2-5 only.
- (17) Only available with HART 4-20mA output (output code A).
- (18) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.
- (19) Not valid with Alternate Process Connections S5 & S6.
- (20) Requires one of the Diaphragm Seal Assemblies codes (S1 or S2).

Model	Transmitter Type (Select One)	
2051T	In-Line Pressure Transmitter	
Model	Measurement Type	
G	Gage	
A	Absolute	
Code	Pressure Ranges (Ranges/ Min. Span)	
	2051TG	2051TA
1	–14.7 to 30 psi/0.3 psi (–1,01 to 2,1 bar/20,7 mbar)	0 to 30 psia/0.3 psia (0 to 2,1 bar/20,7 mbar)
2	–14.7 to 150 psi/1.5 psi (–1,01 to 10,3 bar/103,4 mbar)	0 to 150 psia/1.5 psia (0 to 10,3 bar/103,4 mbar)
3	–14.7 to 800 psi/8 psi (–1,01 to 55,2 bar/0,55 bar)	0 to 800 psia/8 psia (0 to 55,2 bar/0,55 bar)
4	–14.7 to 4000 psi/40 psi (–1,01 to 275,8 bar/2,8 bar)	0 to 4000 psia/40 psia (0 to 275,8 bar/2,8 bar)
5	–14.7 to 10000 psi/2000 psi (–1,01 to 689,5 bar/138 bar)	0 to 10000 psia/2000 psia (0 to 689,5 bar/138 bar)
Code	Output	
A	4–20 mA with Digital Signal Based on HART Protocol	
M	Low-Power, 1–5 V dc with Digital Signal Based on HART Protocol	
F	FOUNDATION fieldbus Protocol	
Code	Process Connection Style	
2B	1/2–14 NPT female	
2C	G1/2 A DIN 16288 male (Range 1-4 only)	
2F	Coned and Threaded, Compatible with Autoclave Type F-250-C (Includes Gland and Collar, Available in SST for Range 5 only)	
Code	Isolating Diaphragm	
2 ⁽¹⁾	316L SST	
3 ⁽¹⁾	Alloy C-276	
Code	Fill Fluid	
1	Silicone	
2	Inert fill (Fluorinert FC-43)	
Code	Housing Material	Conduit Entry Size
A	Polyurethane-covered Aluminum	1/2–14 NPT
B	Polyurethane-covered Aluminum	M20 × 1.5 (CM20)
D	Polyurethane-covered Aluminum	G1/2
J	SST (consult factory for availability)	1/2–14 NPT
K	SST (consult factory for availability)	M20 × 1.5 (CM20)
M	SST (consult factory for availability)	G1/2
Code	Options	
Manifold Assemblies		
S5 ⁽²⁾	Assemble to Rosemount 306 Integral Manifold	
Diaphragm Seal Assemblies		
S1 ⁽²⁾	Assemble to one Rosemount 1199 diaphragm seal	
Mounting Brackets		
B4	Bracket for 2-in. Pipe or Panel Mounting, all SST	
Product Certifications		
E1 ⁽³⁾	ATEX Flameproof	
E2 ⁽³⁾	INMETRO Flameproof (consult factory for availability)	
E3 ⁽³⁾	China Flameproof (consult factory for availability)	
E4 ⁽³⁾	TIIS Flameproof (consult factory for availability)	
E5	FM Explosion-proof, Dust Ignition-proof	
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2	
E7	IECEx Flameproof	
EP ⁽³⁾	Korea (KOSHA) Flameproof Approval (consult factory for availability)	
EW ⁽³⁾	India (CCOE) Flameproof Approval (consult factory for availability)	
EM ⁽³⁾	GOST Explosion-proof (consult factory for availability)	

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I1	ATEX Intrinsic Safety
I2 ⁽³⁾	INMETRO Intrinsic Safety (consult factory for availability)
I3 ⁽³⁾	China Intrinsic Safety (consult factory for availability)
I4 ⁽³⁾	TIIS Intrinsic Safety (consult factory for availability)
I5	FM Intrinsically Safe, Division 2
I6	CSA Intrinsically Safe
I7 ⁽³⁾	IECEx Intrinsic Safety
IA ⁽⁴⁾	ATEX FISCO Intrinsic Safety
IB ⁽⁴⁾	INMETRO FISCO Intrinsic Safety (consult factory for availability)
ID ⁽⁴⁾	TIIS FISCO Intrinsic Safety (consult factory for availability)
IE ⁽⁴⁾	FM FISCO Intrinsically Safe
IF ⁽⁴⁾	CSA FISCO Intrinsically Safe
IG ⁽⁴⁾	IECEx FISCO Intrinsically Safe
IP ⁽³⁾	Korea (KOSHA) Intrinsic Safety (consult factory for availability)
IM ⁽³⁾	GOST Intrinsically Safe (consult factory for availability)
IW ⁽³⁾	India (CCOE) Intrinsic Safety Approval (consult factory for availability)
K1 ⁽³⁾	ATEX Flameproof, Intrinsic Safety, Type n, Dust
K2 ⁽³⁾	INMETRO Flameproof, Intrinsic Safety, Type n (consult factory for availability)
K4 ⁽³⁾	TIIS Flameproof, Intrinsic Safety (consult factory for availability)
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2
K7 ⁽³⁾	IECEx Flameproof, Intrinsic Safety, Type n
KA	ATEX and CSA Flameproof, Intrinsically Safe, Division 2
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2
KD ⁽³⁾	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe
N1 ⁽³⁾	ATEX Type n
N7 ⁽³⁾	IECEx Type n
ND	ATEX Dust
Digital Display	
M5	LCD display
Special Configuration (Hardware)	
D4 ⁽⁵⁾	Zero and Span Hardware Adjustments
V5 ⁽⁶⁾	External Ground Screw Assembly
Performance	
P8 ⁽⁷⁾	0.065% accuracy and 5 year stability
Terminal Blocks	
T1	Transient Protection Terminal Block
Special Configuration (Software)	
C1 ⁽⁸⁾	Custom Software Configuration (Requires completed Configuration Data Sheet)
C4 ⁽⁸⁾⁽⁹⁾	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High
CN ⁽⁸⁾⁽⁹⁾	Analog Output Levels Compliant with NAMUR Recommendation NE 43 Alarm Low
Special Procedures	
P1	Hydrostatic Testing with Certificate
P2 ⁽¹⁰⁾	Cleaning for Special Service
P3 ⁽¹⁰⁾	Cleaning for <1 PPM Chlorine/Fluorine

Special Certifications

Q4	Calibration Certificate
Q8	Material Traceability Certification per EN 10204 3.1.B
QS ⁽⁸⁾	Prior-use certificate of FMEDA data
Q16 ⁽¹¹⁾	Surface finish certification for sanitary remote seals
QP	Calibration certification and tamper evident seal
QZ ⁽¹¹⁾	Remote Seal System Performance Calculation Report

Typical Model Number: 2051T G 3 A 2B 1 A B4 M5

- (1) *Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.*
- (2) *"Assemble-to" items are specified separately and require a completed model number.*
- (3) *Not available with Low Power output code M.*
- (4) *Only valid with FOUNDATION fieldbus output code F.*
- (5) *Not available with FOUNDATION fieldbus output code F.*
- (6) *The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.*
- (7) *Available for HART 4-20mA output code A. Valid for Ranges 1-4 only.*
- (8) *Only available with HART 4-20mA output (output code A).*
- (9) *NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.*
- (10) *Not valid with Alternate Process Connection S5.*
- (11) *Requires S1 Diaphragm Seal Assembly code.*

Model	Transmitter Type		
2051L	Flange-Mounted Liquid Level Transmitter		
Code	Pressure Ranges (Range/Minimum Span)		
2	–250 to 250 inH ₂ O/2.5 inH ₂ O (–0,6 to 0,6 bar/6,2 mbar)		
3	–1000 to 1000 inH ₂ O/10 inH ₂ O (–2,5 to 2,5 bar/25 mbar)		
4	–300 to 300 psi/3 psi (–20,7 to 20,7 bar/0,2 bar)		
Code	Output		
A	4–20 mA with Digital Signal Based on HART Protocol		
M	Low-Power, 1–5 V dc with Digital Signal Based on HART Protocol		
F	FOUNDATION fieldbus Protocol		
Code	High Pressure Side		
	Diaphragm Size	Material	Extension Length
G0	2 in./DN 50	316L SST	Flush Mount Only
H0	2 in./DN 50	Alloy C-276	Flush Mount Only
A0	3 in./DN 80	316L SST	Flush Mount
A2	3 in./DN 80	316L SST	2 in./50 mm
A4	3 in./DN 80	316L SST	4 in./100 mm
A6	3 in./DN 80	316L SST	6 in./150 mm
B0	4 in./DN 100	316L SST	Flush Mount
B2	4 in./DN 100	316L SST	2 in./50 mm
B4	4 in./DN 100	316L SST	4 in./100 mm
B6	4 in./DN 100	316L SST	6 in./150 mm
C0	3 in./DN 80	Alloy C-276	Flush Mount
C2	3 in./DN 80	Alloy C-276	2 in./50 mm
C4	3 in./DN 80	Alloy C-276	4 in./100 mm
C6	3 in./DN 80	Alloy C-276	6 in./150 mm
D0	4 in./DN 100	Alloy C-276	Flush Mount
D2	4 in./DN 100	Alloy C-276	2 in./50 mm
D4	4 in./DN 100	Alloy C-276	4 in./100 mm
D6	4 in./DN 100	Alloy C-276	6 in./150 mm
Code	Mounting Flange		
	Size	Rating	Material
M	2 in.	Class 150, ANSI	CS
A	3 in.	Class 150, ANSI	CS
B	4 in.	Class 150, ANSI	CS
N	2 in.	Class 300, ANSI	CS
C	3 in.	Class 300, ANSI	CS
D	4 in.	Class 300, ANSI	CS
X	2 in.	Class 150, ANSI	SST
F	3 in.	Class 150, ANSI	SST
G	4 in.	Class 150, ANSI	SST
Y	2 in.	Class 300, ANSI	SST
H	3 in.	Class 300, ANSI	SST
J	4 in.	Class 300, ANSI	SST
Q	DN50	PN 10-40, DIN	CS
R	DN80	PN 40, DIN	CS
K	DN50	PN 10-40, DIN	SST
T	DN80	PN 40, DIN	SST

Rosemount 2051

Code	Process Fill-High Pressure Side	Temperature Limits		
A	Syltherm® XLT	-100 to 300 °F (-73 to 135 °C)		
C	D.C. Silicone 704	60 to 400 °F (15 to 205 °C)		
D	D.C. Silicone 200	-40 to 400 °F (-40 to 205 °C)		
H	Inert (Halocarbon)	-50 to 350 °F (-45 to 177 °C)		
G	Glycerin and Water	0 to 200 °F (-17 to 93 °C)		
N	Neobee® M-20	0 to 400 °F (-17 to 205 °C)		
P	Propylene Glycol and Water	0 to 200 °F (-17 to 93 °C)		
Code	Low Pressure Side			
	Configuration	Flange Adapter	Diaphragm Material	Sensor Fill Fluid
11	Gage	SST	316L SST	Silicone
21	Differential	SST	316L SST	Silicone
22	Differential (SST Valve Seat)	SST	Alloy C-276	Silicone
2A	Differential	SST	316L SST	Inert (Halocarbon)
2B	Differential (SST Valve Seat)	SST	Alloy C-276	Inert (Halocarbon)
31	Remote Seal	SST	316L SST	Silicone
Code	O-ring			
A	Glass-filled PTFE			
Code	Housing Material	Conduit Entry Size		
A	Polyurethane-covered Aluminum	½–14 NPT		
B	Polyurethane-covered Aluminum	M20 × 1.5 (CM20)		
D	Polyurethane-covered Aluminum	G½		
J	SST (consult factory for availability)	½–14 NPT		
K	SST (consult factory for availability)	M20 × 1.5 (CM20)		
M	SST (consult factory for availability)	G½		
Code	Options			
Diaphragm Seal Assembly				
S1 ⁽¹⁾	Assemble to one Rosemount 1199 diaphragm seal			
Product Certifications				
E1 ⁽²⁾	ATEX Flameproof			
E2 ⁽²⁾	INMETRO Flameproof (consult factory for availability)			
E3 ⁽²⁾	China Flameproof (consult factory for availability)			
E4 ⁽²⁾	TIIS Flameproof (consult factory for availability)			
E5	FM Explosion-proof, Dust Ignition-proof			
E6	CSA Explosion-proof, Dust Ignition-proof, Division 2			
E7	IECEx Flameproof			
EP ⁽²⁾	Korea (KOSHA) Flameproof Approval (consult factory for availability)			
EW ⁽²⁾	India (CCOE) Flameproof Approval (consult factory for availability)			
EM ⁽²⁾	GOST Explosion-proof (consult factory for availability)			
I1	ATEX Intrinsic Safety			
I2 ⁽²⁾	INMETRO Intrinsic Safety (consult factory for availability)			
I3 ⁽²⁾	China Intrinsic Safety (consult factory for availability)			
I4 ⁽²⁾	TIIS Intrinsic Safety (consult factory for availability)			
I5	FM Intrinsically Safe, Division 2			
I6	CSA Intrinsically Safe			
I7 ⁽²⁾	IECEx Intrinsic Safety			
IA ⁽³⁾	ATEX FISCO Intrinsic Safety			
IB ⁽³⁾	INMETRO FISCO Intrinsic Safety (consult factory for availability)			
ID ⁽³⁾	TIIS FISCO Intrinsic Safety (consult factory for availability)			
IE ⁽³⁾	FM FISCO Intrinsically Safe			
IF ⁽³⁾	CSA FISCO Intrinsically Safe			
IG ⁽³⁾	IECEx FISCO Intrinsically Safe			
IP ⁽²⁾	Korea (KOSHA) Instrinsic Safety (consult factory for availability)			
IM ⁽²⁾	GOST Intrinsically Safe (consult factory for availability)			

IW ⁽²⁾	India (CCOE) Intrinsic Safety Approval (consult factory for availability)
K1 ⁽²⁾	ATEX Flameproof, Intrinsic Safety, Type n, Dust
K2 ⁽²⁾	INMETRO Flameproof, Intrinsic Safety, Type n (consult factory for availability)
K4 ⁽²⁾	TIIS Flameproof, Intrinsic Safety (consult factory for availability)
K5	FM Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2
K6	CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2
K7 ⁽²⁾	IECEx Flameproof, Intrinsic Safety, Type n
KA	ATEX and CSA Flameproof, Intrinsically Safe, Division 2
KB	FM and CSA Explosion-proof, Dust Ignition-proof, Intrinsically Safe, Division 2
KC	FM and ATEX Explosion-proof, Intrinsically Safe, Division 2
KD ⁽²⁾	FM, CSA, and ATEX Explosion-proof, Intrinsically Safe
N1 ⁽²⁾	ATEX Type n
N7 ⁽²⁾	IECEx Type n
ND	ATEX Dust

Digital Display

M5	LCD display
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Special Configuration (Hardware)

D4 ⁽⁴⁾	Zero and Span Hardware Adjustments
DF ⁽⁵⁾	1/2-14 NPT Flange Adapters
V5 ⁽⁶⁾	External Ground Screw Assembly

Terminal Blocks

T1	Transient Protection Terminal Block
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Special Configuration (Software)

C1 ⁽⁷⁾	Custom Software Configuration (Requires completed Configuration Data Sheet)
C4 ⁽⁷⁾⁽⁸⁾	Analog Output Levels Compliant with NAMUR Recommendation NE 43, Alarm High
CN ⁽⁷⁾⁽⁸⁾	Analog Output Levels Compliant with NAMUR Recommendation NE 43 Alarm Low

Special Certifications

Q4	Calibration Certificate
Q8	Material Traceability Certification per EN 10204 3.1.B
QS ⁽⁷⁾	Prior-use certificate of FMEDA data
Q16	Surface finish certification for sanitary remote seals
QP	Calibration certification and tamper evident seal
QZ	Remote Seal System Performance Calculation Report

Flushing Connections

F1	One 1/4-inch Connector, SST Ring Material
F2	Two 1/4-inch Connectors, SST Ring Material
F3 ⁽⁹⁾	One 1/4-inch Connector, Cast C-276 Ring Material
F4 ⁽⁹⁾	Two 1/4-inch Connectors, Cast C-276 Ring Material
F7	One 1/2-inch Connector, SST Ring Material
F8	Two 1/2-inch Connectors, SST Ring Material
F9	One 1/2-inch Connector, Cast C-276 Ring Material
F0	Two 1/2-inch Connectors, Cast C-276 Ring Material

Typical Model Number: 2051L 2 A 2 2 A 1 A B4

(1) "Assemble-to" items are specified separately and require a completed model number.

(2) Not available with Low Power output code M.

(3) Only valid with FOUNDATION fieldbus output code F.

(4) Not valid with FOUNDATION fieldbus output code F.

(5) Not available with Diaphragm Seal Assembly option S1.

(6) The V5 option is not needed with the T1 option; external ground screw assembly is included with the T1 option.

(7) Only available with HART 4-20mA output (output code A).

(8) NAMUR-Compliant operation is pre-set at the factory and cannot be changed to standard operation in the field.

(9) Not available with Option Codes A0, B0, and G0.

OPTIONS**Standard Configuration**

Unless otherwise specified, transmitter is shipped as follows:

Engineering Units 2051C:	inH ₂ O (Ranges 1-3), psi (Ranges 4-5)
Engineering Units 2051T:	psi (all ranges)
Engineering Units 2051L:	inH ₂ O
4 mA (1 V dc)⁽¹⁾:	0 (engineering units above)
20 mA (5 V dc)⁽¹⁾:	Upper range limit
Output:	Linear
Flange type:	Specified model code option
Flange material:	Specified model code option
Drain/vent:	Specified model code option
Integral meter:	Installed or none
Alarm⁽¹⁾:	High
Software tag:	(Blank)

(1) Not applicable to fieldbus.

Tagging (3 options available)

- Standard SST hardware tag is permanently affixed on transmitter. Tag character height is 0.125 in. (3,18 mm), 140 characters maximum.
- Tag may be wired to the transmitter nameplate upon request, 85 characters maximum.
- Tag may be stored in transmitter memory (8 characters maximum). Software tag is left blank unless specified.

Commissioning tag (fieldbus only)

A temporary commissioning tag is attached to all transmitters. The tag indicates the device ID and allows an area for writing the location.

Optional Rosemount 304, 305 or 306 Integral Manifolds

Factory assembled to 2051C and 2051T transmitters. Refer to Product Data Sheet (document number 00813-0100-4839 for Rosemount 304 and 00813-0100-4733 for Rosemount 305 and 306) for additional information.

Optional Diaphragm and Sanitary Seals

Refer to Product Data Sheet (document number 00813-0100-4016 or 00813-0201-4016) for additional information.

Output Information

Output range points must be the same unit of measure. Available units of measure include:

inH ₂ O	inH ₂ O@4 °C ⁽¹⁾	psi	Pa
inHg	ftH ₂ O	bar	kPa
mmH ₂ O	mmH ₂ O@4 °C ⁽¹⁾	mbar	torr
mmHg	g/cm ²	kg/cm ²	atm

(1) Not available on low power.

Hardware Adjustments

D4 Local zero and span adjustments

- Alarm and security adjustments ship standard

LCD display

M5 Digital Meter

- 2-Line, 5-Digit LCD for 4-20 mA HART and FOUNDATION fieldbus
- 1-Line, 4-Digit LCD for 1-5 Vdc HART Low Power
- Direct reading of digital data for higher accuracy
- Displays user-defined flow, level, volume, or pressure units
- Displays diagnostic messages for local troubleshooting
- 90-degree rotation capability for easy viewing

Transient Protection

T1 Integral Transient Protection Terminal Block

Meets IEEE C62.41, Category Location B

- 6 kV crest (0.5 μ s - 100 kHz)
- 3 kV crest (8 \times 20 microseconds)
- 6 kV crest (1.2 \times 50 microseconds)

Bolts for Flanges and Adapters

- Standard material is plated carbon steel per ASTM A449, Type 1

L4 Austenitic 316 Stainless Steel Bolts

L5 ASTM A 193, Grade B7M Bolts

L8 ASTM A 193 Class 2, Grade B8M Bolts

Rosemount 2051C Coplanar Flange and 2051T Bracket Option

B4 Bracket for 2-in. Pipe or Panel Mounting

- For use with the standard *Coplanar* flange configuration
- Bracket for mounting of transmitter on 2-in. pipe or panel
- Stainless steel construction with stainless steel bolts

Rosemount 2051C Traditional Flange Bracket Options

B1 Bracket for 2-in. Pipe Mounting

- For use with the traditional flange option
- Bracket for mounting on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B2 Bracket for Panel Mounting

- For use with the traditional flange option
- Bracket for mounting transmitter on wall or panel
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B3 Flat Bracket for 2-in. Pipe Mounting

- For use with the traditional flange option
- Bracket for vertical mounting of transmitter on 2-in. pipe
- Carbon steel construction with carbon steel bolts
- Coated with polyurethane paint

B7 B1 Bracket with SST Bolts

- Same bracket as the B1 option with Series 300 stainless steel bolts

B8 B2 Bracket with SST Bolts

- Same bracket as the B2 option with Series 300 stainless steel bolts

B9 B3 Bracket with SST Bolts

- Same bracket as the B3 option with Series 300 stainless steel bolts

BA Stainless Steel B1 Bracket with SST Bolts

- B1 bracket in stainless steel with Series 300 stainless steel bolts

BC Stainless Steel B3 Bracket with SST Bolts

- B3 bracket in stainless steel with Series 300 stainless steel bolts

SPARE PARTS

Terminal Block, FOUNDATION fieldbus	Part Number
Terminal Block	
Standard terminal block assembly	02051-9005-0021
Transient terminal block assembly (option T1)	02051-9005-0022
FISCO terminal block assembly	02051-9005-0023

Electronics Board	Part Number
Assembly for FOUNDATION fieldbus	02051-9001-2001

LCD Display, FOUNDATION fieldbus	
LCD Display Kit⁽¹⁾	
Kit for Aluminum Housing	03031-0193-0104
Kit for SST Housing	03031-0193-0112
LCD Displays Only⁽²⁾	
Display for both Aluminum and SST Housing	03031-0193-0105
LCD Display Hardware	
Aluminum Display Cover Assembly ⁽³⁾	03031-0193-0007
SST Display Cover Assembly ⁽³⁾	03031-0193-0013
O-ring package for electronics housing cover, pkg of 12	03031-0232-0001

(1) Kit includes LCD display, captive mounting hardware, 10-pin interconnection header, cover assembly.

(2) Displays include LCD, captive mounting hardware, 10-pin interconnection header. No cover assembly.

(3) Display Cover Assembly includes the cover and o-ring only.

O-Ring Packages (package of 12)	Part Number
Electronic housing, cover (standard and meter)	03031-0232-0001
Electronics housing, module	03031-0233-0001
Process flange, glass-filled PTFE	03031-0234-0001
Process flange, graphite-filled PTFE	03031-0234-0002
Flange adapter, glass-filled PTFE	03031-0242-0001
Flange adapter, graphite-filled PTFE	03031-0242-0002

Flanges	Part Number
Differential Coplanar Flange	
Nickel-plated carbon steel	03031-0388-0025
316 SST	03031-0388-0022
Cast C-276	03031-0388-0023

Gage Coplanar Flange	
Nickel-plated carbon steel	03031-0388-1025
316 SST	03031-0388-1022
Cast C-276	03031-0388-1023

Coplanar Flange Alignment Screw (package of 12)	03031-0309-0001
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Traditional Flange	
316 SST	03031-0320-0002
Cast C-276	03031-0320-0003

Level Flange, Vertical Mount	
2 in., class 150, SST	03031-0393-0221
2 in., class 300, SST	03031-0393-0222
3 in., class 150, SST	03031-0393-0231
3 in., class 300, SST	03031-0393-0232
DIN, DN 50, PN 40	03031-0393-1002
DIN, DN 80, PN 40	03031-0393-1012

Flange Adapter	Part Number
Nickel-plated carbon steel	02024-0069-0005
316 SST	02024-0069-0002
Cast C-276	02024-0069-0003
Drain/Vent Valve Kits (each kit contains parts for one transmitter)	Part Number
Differential Drain/Vent Kits	
316 SST stem and seat kit	01151-0028-0022
Alloy C-276 stem and seat kit	01151-0028-0023
316 SST ceramic ball drain/vent kit	03031-0378-0022
Alloy C-276 ceramic ball drain/vent kit	01151-0028-0123
Gage Drain/Vent Kits	
316 SST stem and seat kit	01151-0028-0012
Alloy C-276 stem and seat kit	01151-0028-0013
316 SST ceramic ball drain/vent kit	03031-0378-0012
Alloy C-276 ceramic ball drain/vent kit	01151-0028-0113
Mounting Brackets	
2051C and 2051L Coplanar Flange Bracket Kit	
B4 bracket, SST, 2-in. pipe mount, SST bolts	03031-0189-0003
2051T Bracket Kit	
B4 bracket, SST, 2-in. pipe mount, SST bolts	03031-0189-0004
2051C Traditional Flange Bracket Kits	
B1 bracket, 2-in. pipe mount, CS bolts	03031-0313-0001
B2 bracket, panel mount, CS bolts	03031-0313-0002
B3 flat bracket for 2-in. pipe mount, CS bolts	03031-0313-0003
B7 (B1 style bracket with SST bolts)	03031-0313-0007
B8 (B2 style bracket with SST bolts)	03031-0313-0008
B9 (B3 style bracket with SST bolts)	03031-0313-0009
BA (SST B1 bracket with SST bolts)	03031-0313-0011
BC (SST B3 bracket with SST bolts)	03031-0313-0013
Bolt Kits	
COPLANAR FLANGE	
Flange Bolt Kit {44 mm (1.75 in.)} (Set of 4)	
Carbon steel	03031-0312-0001
316 SST	03031-0312-0002
ASTM A 193, Grade B7M	03031-0312-0003
ASTM A 193, Class 2, Grade B8M	03031-0312-0005
Flange/Adapter Bolt Kit {73 mm (2.88 in.)} (Set of 4)	
Carbon steel	03031-0306-0001
316 SST	03031-0306-0002
ASTM A 193, Grade B7M	03031-0306-0003
ASTM A 193, Class 2, Grade B8M	03031-0306-0005
Manifold/Flange Kit {57 mm (2.25 in.)} (Set of 4)	
Carbon steel	03031-0311-0001
316 SST	03031-0311-0002
ASTM A 193, Grade B7M	03031-0311-0003
ASTM A 193, Class 2, Grade B8M	03031-0311-0020
TRADITIONAL FLANGE	
Differential Flange and Adapter Bolt Kit {44 mm (1.75 in.)} (Set of 8)	
Carbon steel	03031-0307-0001
316 SST	03031-0307-0002
ASTM A 193, Grade B7M	03031-0307-0003
ASTM A 193, Class 2, Grade B8M	03031-0307-0005

Gage Flange and Adapter Bolt Kit (Set of 6)

Carbon steel	03031-0307-1001
316 SST	03031-0307-1002
ASTM A 193, Grade B7M	03031-0307-1003
ASTM A 193, Class 2, Grade B8M	03031-0307-1005

Manifold/Traditional Flange Bolts

Carbon steel	Use bolts supplied with manifold
316 SST	Use bolts supplied with manifold

LEVEL FLANGE, VERTICAL MOUNT

Flange Bolt Kit (Set of 4)

Carbon steel	03031-0395-0001
316 SST	03031-0395-0002

Covers

Aluminum field terminal cover + o-ring	03031-0292-0001 ⁽¹⁾
SST field terminal cover + o-ring	03031-0292-0002 ⁽¹⁾
Aluminum HART electronics cover: cover + o-ring	03031-0292-0001 ⁽¹⁾
316 SST HART electronics cover: cover + o-ring	03031-0292-0002 ⁽¹⁾
Aluminum Electronics / LCD Display Cover Assembly: cover + o-ring	03031-0193-0002
SST Electronics / LCD Display Cover Assembly: cover + o-ring	03031-0193-0012

⁽¹⁾ Covers are blind, not for use with LCD Display. Refer to LCD Display section for LCD covers.

Appendix B

Approval Information

Overview	page B-1
Safety Messages	page B-1
Fieldbus Protocol	page B-2
Approval Drawings	page B-8

OVERVIEW

This Appendix contains information on Approved manufacturing locations, European directive information, Ordinary Location certification, Hazardous Locations Certifications and approval drawings for FOUNDATION fieldbus protocol.

SAFETY MESSAGES

Procedures and instructions in this section may require special precautions to ensure the safety of the personnel performing the operations. Information that raises potential safety issues is indicated by a warning symbol (⚠). Refer to the following safety messages before performing an operation preceded by this symbol.

Warnings

⚠ WARNING

Explosions could result in death or serious injury:

Installation of this transmitter in an explosive environment must be in accordance with the appropriate local, national, and international standards, codes, and practices. Please review this section of the Rosemount 2051 reference manual for any restrictions associated with a safe installation.

- Before connecting a Field Communicator in an explosive atmosphere, make sure the instruments in the loop are installed in accordance with intrinsically safe or non-incendive field wiring practices.
- In an Explosion-Proof/Flameproof installation, do not remove the transmitter covers when power is applied to the unit.

Process leaks may cause harm or result in death.

- Install and tighten process connectors before applying pressure.

Electrical shock can result in death or serious injury.

- Avoid contact with the leads and terminals. High voltage that may be present on leads can cause electrical shock.

⚠ WARNING

Cable gland and plug must comply with the requirements listed on the certificates.

Approved Manufacturing Locations

Rosemount Inc. — Chanhassen, Minnesota USA
Emerson Process Management GmbH & Co. — Wessling, Germany
Emerson Process Management Asia Pacific Private Limited — Singapore
Beijing Rosemount Far East Instrument Co., LTD — Beijing, China

European Directive Information

The EC declaration of conformity for all applicable European directives for this product can be found on the Rosemount website at www.rosemount.com. A hard copy may be obtained by contacting an Emerson Process Management representative.

ATEX Directive (94/9/EC)

All 2051 transmitters comply with the ATEX Directive.

European Pressure Equipment Directive (PED) (97/23/EC)

2051CG2, 3, 4, 5; 2051CD2, 3, 4, 5 (also with P9 option)

— QS Certificate of Assessment - EC No. PED-H-100

Module H Conformity Assessment

All other 2051 Pressure Transmitters

— Sound Engineering Practice

Transmitter Attachments: Diaphragm Seal - Process Flange - Manifold

— Sound Engineering Practice

Electro Magnetic Compatibility (EMC) (2004/108/EC)

All 2051 Pressure Transmitters meet all of the requirements of IEC/EN61326:2006 and NAMUR NE-21.

Ordinary Location Certification for Factory Mutual

As standard, the transmitter has been examined and tested to determine that the design meets basic electrical, mechanical, and fire protection requirements by FM, a nationally recognized testing laboratory (NRTL) as accredited by the Federal Occupational Safety and Health Administration (OSHA).

FIELD BUS PROTOCOL

Hazardous Locations Certifications

North American Certifications

FM Approvals

- E5** Explosion-Proof for Class I, Division 1, Groups B, C, and D.
Dust-Ignition-Proof for Class II, Division 1, Groups E, F, and G.
Dust-Ignition-Proof for Class III, Division 1.

T5 (Ta = 85 °C), Factory Sealed, Enclosure Type 4X

- I5/IE** Intrinsically Safe for use in Class I, Division 1, Groups A, B, C, and D; Class II, Division 1, Groups E, F, and G; Class III, Division 1 when connected per Rosemount drawing 02051-1009; Non-incendive for Class I, Division 2, Groups A, B, C, and D.

Temperature Code: T4 (Ta = 40 °C), T3 (Ta = 85 °C),

Enclosure Type 4X

For input parameters see control drawing 02051-1009.

Canadian Standards Association (CSA)

- E6** Explosion-Proof for Class I, Division 1, Groups B, C, and D.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D for indoor and outdoor hazardous locations. Enclosure type 4X, factory sealed
- I6/IF** Intrinsically safe approval. Intrinsically safe for Class I, Division 1, Groups A, B, C, and D when connected in accordance with Rosemount drawings 02051-1008. Temperature Code T3C.
Dust-Ignition-Proof for Class II and Class III, Division 1, Groups E, F, and G. Suitable for Class I, Division 2 Groups A, B, C, and D hazardous locations. Enclosure type 4X, factory sealed
For input parameters see control drawing 02051-1008.

European Certifications


- I1** ATEX Intrinsic Safety
Certification No. Baseefa08ATEX0129X  II 1 G
Ex ia IIC T4 (T_{amb} = -60 to +60 °C)
IP66
CE 1180

Table B-1. Input Parameters

U_i = 30V
I_i = 300 mA
P_i = 1.3 W
C_i = 0 µF

Special Conditions for Safe Use (X):

The device is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.



- IA** ATEX FISCO Intrinsic Safety
Certification No. Baseefa08ATEX0129X  II 1 G
Ex ia IIC T4 (T_{amb} = -60 to +60 °C)
IP66
CE 1180

Table B-2. Input Parameters

U_i = 17.5 V
I_i = 380 mA
P_i = 5.32 W
C_i = ≤ 5 µF
L_i = ≤ 10 µH

Special Conditions for Safe Use (X):


The device is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

- N1** ATEX Type n
Certification No. Baseefa08ATEX0130X  II 3 G
Ex nAnL IIC T4 (T_{amb} = -40 to +70 °C)
U_i = 32 Vdc max
IP66

Special Conditions for Safe Use (X):

The device is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

E1 ATEX Flame-Proof

Certification No. KEMA 08ATEX0090X G  II 1/2 G

Ex d IIC T6 ($T_{amb} = -50$ to 65 °C)

Ex d IIC T5 ($T_{amb} = -50$ to 80 °C)

IP66

cE 1180

$V_{max} = 32$ V dc

Special Conditions for Safe Use (X):

1. Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.

2. This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.

3. The 2051 does not comply with the requirements of IEC 60079-1 Clause 5 for flameproof joints. Contact Emerson Process Management for information on the dimensions of flameproof joints.

ND ATEX Dust

Certification No. Baseefa08ATEX0182X  II 1 D

Dust Rating: T_{80} °C ($-20 \leq T_a \leq 40$ °C) IP66 IP68

$V_{max} = 42.4$ V dc

$A = 22$ mA

cE 1180

Special Conditions for Safe Use (X):

1. The user must ensure that the maximum rated voltage and current (42.4 volts, 22 milliamperes, DC) are not exceeded. All connections to other apparatus or associated apparatus shall have control over this voltage and current equivalent to a category "ib" circuit according to EN 60079-1.
2. Cable entries must be used which maintain the ingress protection of the enclosure to at least IP66.
3. Unused cable entries must be filled with suitable blanking plugs which maintain the ingress protection of the enclosure to at least IP66.
4. Cable entries and blanking plugs must be suitable for the ambient range of the apparatus and capable of withstanding a 7J impact test.

IECEx Certifications


- I7** IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X  II 1 G
Ex ia IIC T4 (T_{amb} = -60 to +60 °C)
IP66
cE 1180

Table B-3. Input Parameters

U_i = 30V

I_i = 300 mA

P_i = 1.3 W

C_i = 0 µF

Special Conditions for Safe Use (X):

The device is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the apparatus.


- IG** IECEx Intrinsic Safety
Certification No. IECExBAS08.0045X  II 1 G
Ex ia IIC T4 (T_{amb} = -60 to +60 °C)
IP66
cE 1180

Table B-4. Input Parameters

U_i = 17.5 V

I_i = 380 mA


P_i = 5.32 W

C_i = ≤ 5 µF

L_i = ≤ 10 µH

Special Conditions for Safe Use (X):


The device is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the apparatus.

- E7** IECEx Explosion-Proof (Flame-Proof)
Certification No. IECEx KEM 08.0020X  II 1/2 GD
Ex d IIC T6 (T_{amb} = -50 to 65 °C)
Ex d IIC T5 (T_{amb} = -50 to 80 °C)
IP66
cE 1180
V_{max} = 32 V dc

Special Conditions for Safe Use (X):

1. Appropriate ex d blanking plugs, cable glands, and wiring needs to be suitable for a temperature of 90 °C.
2. This device contains a thin wall diaphragm. Installation, maintenance and use shall take into account the environmental conditions to which the diaphragm will be subjected. The manufacturer's instructions for maintenance shall be followed in detail to assure safety during its expected lifetime.
3. The 2051 does not comply with the requirements of IEC 60079-1 Clause 5 for flameproof joints. Contact Emerson Process Management for information on the dimensions of flameproof joints.

N7 IECEx Type n

Certification No. IECExBAS08.0046X  II 3 G
Ex nAnL IIC T4 ($T_{amb} = -40$ to $+70$ °C)
 $U_i = 32$ Vdc max

Special Conditions for Safe Use (X):

The device is not capable of withstanding the 500V insulation test required by Clause 6.3.12 of IEC60079-11. This must be taken into account when installing the device.

TIIS Certifications

(consult factory for availability)

E4 TIIS Flame-Proof

Ex d IIC T6

I4 TIIS Intrinsic Safety

Ex ia IIC T4

ID TIIS FISCO Intrinsic Safety

Certificate Pending

Inmetro Certifications

(consult factory for availability)

E2 Flame-Proof

BR-Ex d IIC T6/T5

I2 Intrinsic Safety

BR-Ex ia IIC T4

IB FISCO Intrinsic Safety

Certificate Pending

GOST Certifications

(consult factory for availability)

IM Intrinsic Safety

Certificate Pending

EM Flame-Proof

Certificate Pending

China (NEPSI) Certifications
(consult factory for availability)

- E3** Flame-Proof
Ex d II B+H₂T3~T5
- I3** Intrinsic Safety
Ex ia IIC T3/T4
- IC** FISCO Intrinsic Safety
Certificate Pending

KOSHA Certifications
(consult factory for availability)

- EP** Flame-Proof
Ex d IIB+H₂ T5
- IP** Intrinsic Safety
Ex ia IIC T3

CCoE Certifications
(consult factory for availability)

- IW** Intrinsic Safety
Ex ia IIC T4
- EW** Flame-Proof
Ex d IIC T5 or T6


Combinations of Certifications

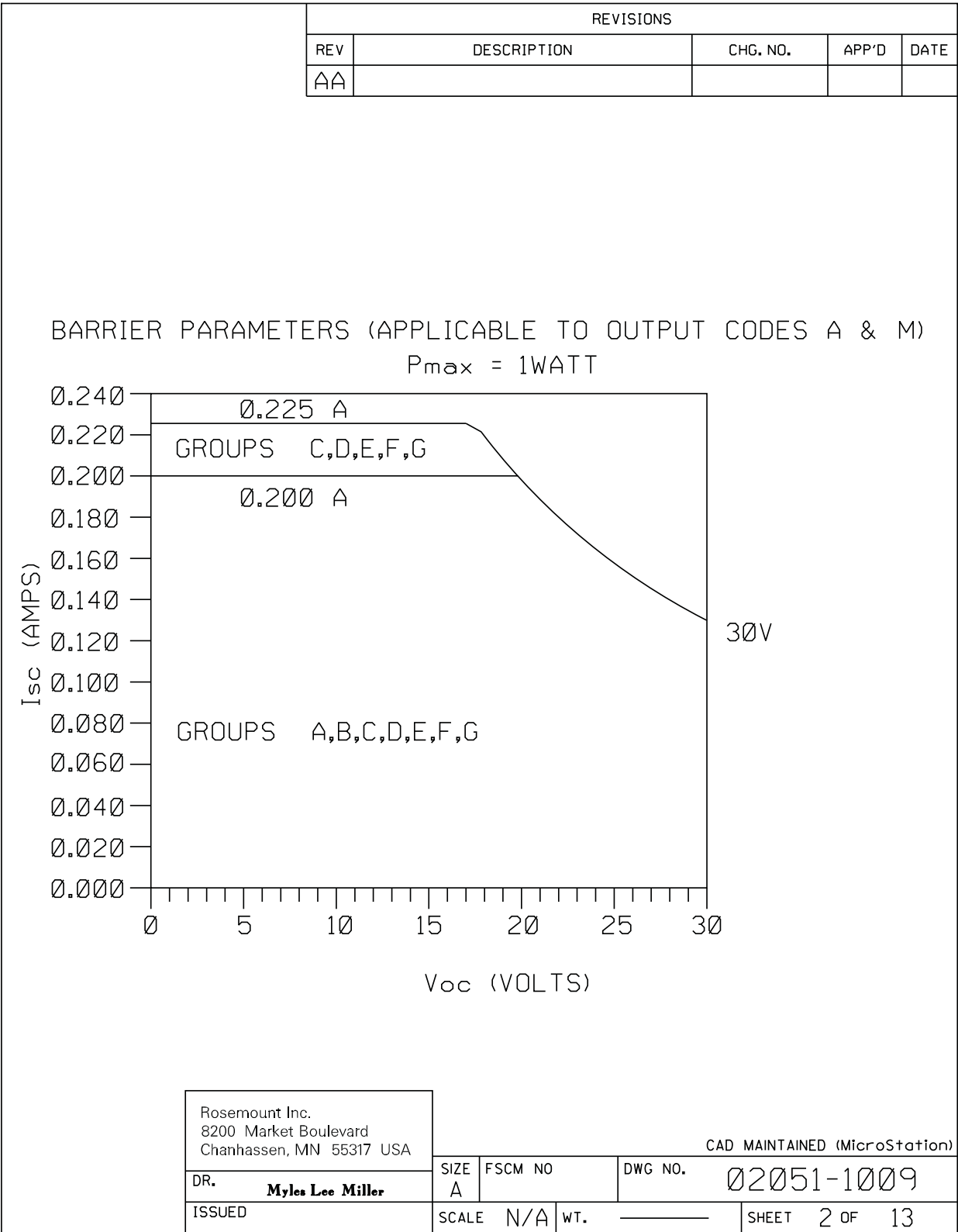
Stainless steel certification tag is provided when optional approval is specified. Once a device labeled with multiple approval types is installed, it should not be reinstalled using any other approval types. Permanently mark the approval label to distinguish it from unused approval types.

- K1** **E1**, **I1**, **N1**, and **ND** combination
- K2** **E2** and **I2** combination (consult factory for availability)
- K4** **E4** and **I4** combination (consult factory for availability)
- K5** **E5** and **I5** combination
- K6** **I6** and **E6** combination
- K7** **E7**, **I7**, and **N7** combination
- KA** **E1**, **I1**, **E6**, and **I6** combination
- KB** **E5**, **I5**, **E6**, and **I6** combination
- KC** **E1**, **I1**, **E5**, and **I5** combination
- KD** **E1**, **I1**, **E5**, **I5**, **E6**, and **I6** combination

APPROVAL DRAWINGS

Factory Mutual (FM)

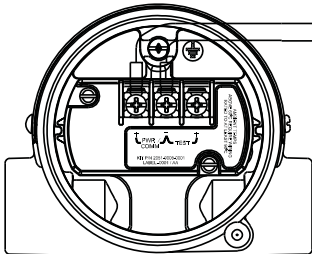
CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY	REVISIONS				
	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AA	NEW RELEASE	RTC1025889	J.G.K.	4/21/08
<p style="text-align: center;">ENTITY APPROVALS FOR</p> <p style="text-align: center;">2051C 2051L 2051T</p> <p>OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-5 OUTPUT CODE M (LOW POWER) I.S. SEE SHEETS 6-7 OUTPUT CODE F/W (FIELD BUS) I.S. SEE SHEETS 8-12 ALL OUTPUT CODES NONINCENDIVE SEE SHEET 13</p> <p>THE ROSEMOUNT TRANSMITTERS LISTED ABOVE ARE F.M. APPROVED AS INTRINSICALLY SAFE WHEN USED IN CIRCUIT WITH F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED IN THE CLASS I, II, AND III, DIVISION 1 GROUPS INDICATED, TEMP CODE T4. ADDITIONALLY, THE ROSEMOUNT 751 FIELD SIGNAL INDICATOR IS F.M. APPROVED AS INTRINSICALLY SAFE WHEN CONNECTED IN CIRCUIT WITH ROSEMOUNT TRANSMITTERS (FROM ABOVE) AND F.M. APPROVED BARRIERS WHICH MEET THE ENTITY PARAMETERS LISTED FOR CLASS I, II, AND III, DIVISION 1, GROUPS INDICATED, TEMP CODE T4.</p> <p>TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM.</p>					
CAD MAINTAINED (MicroStation)					
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES (mm). REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125 -TOLERANCE- .X ± .1 [2,5] .XX ± .02 [0,5] .XXX ± .010 [0,25] FRACTIONS ANGLES ± 1/32 ± 2° DO NOT SCALE PRINT	CONTRACT NO.		 ROSEMOUNT® 8200 Market Boulevard • Chanhassen, MN 55317 USA		
	DR. Myles Lee Miller 4/16/08				
	CHK'D		TITLE INDEX OF I.S. & NONINCENDIVE F.M. FOR 2051C/L/T		
	APP'D.				
	APP'D. GOVT.		SIZE A	FSCM NO.	DWG NO. 02051-1009
		SCALE N/A	WT.	SHEET 1 OF 13	



REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA				

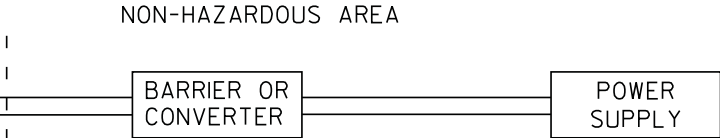
CIRCUIT DIAGRAM 1
ONE BARRIER OR CONVERTER:
SINGLE OR DUAL CHANNEL

HAZARDOUS AREA



OUTPUT CODE A
MODELS INCLUDED
2051C, L, T

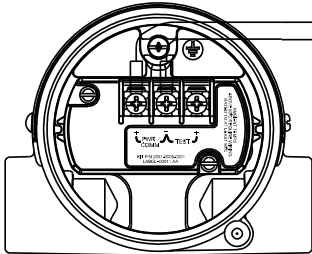
NON-HAZARDOUS AREA



UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

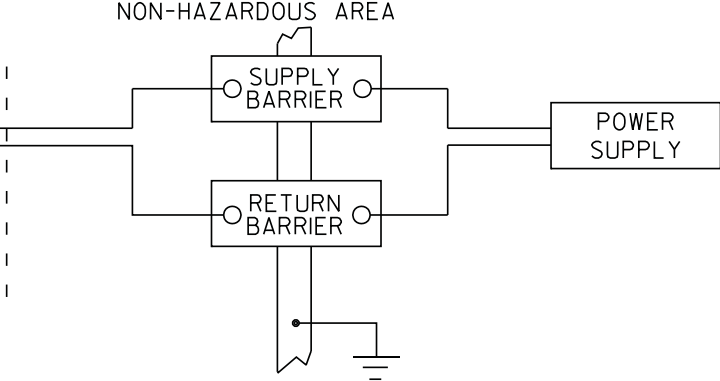
CIRCUIT DIAGRAM 2
SUPPLY AND RETURN BARRIERS
(ONLY FOR USE WITH BARRIERS APPROVED IN THIS CONFIGURATION)

HAZARDOUS AREA



OUTPUT CODE A
MODELS INCLUDED
2051C, L, T

NON-HAZARDOUS AREA



UP TO FOUR MODEL 751 INDICATORS MAY BE WIRED IN SERIES WITH THE TRANSMITTERS SHOWN ABOVE AND MAY BE LOCATED IN EITHER THE HAZARDOUS OR NON-HAZARDOUS AREA.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)		
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009	
ISSUED	SCALE N/A	WT.	SHEET 3 OF 13	

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA				

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (V_{oc} OR V_t) AND MAX. SHORT CIRCUIT CURRENT (I_{sc} OR I_t) AND MAX. POWER ($V_{oc} \times I_{sc}/4$) OR ($V_t \times I_t/4$), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (V_{max}), MAXIMUM SAFE INPUT CURRENT (I_{max}), AND MAXIMUM SAFE INPUT POWER (P_{max}) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (C_a) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_i) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (L_a) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS.

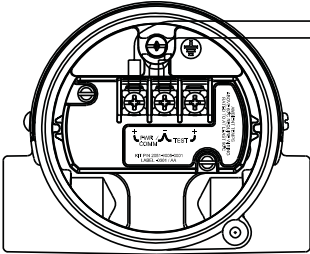
FOR OUTPUT CODE A NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

CLASS I, DIV. 1, GROUPS A AND B

$V_T = 30V$	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_T = 200mA$	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 200mA
$P_{MAX} = 1 \text{ WATT}$	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{oc} \times I_{sc}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
$C_I = .01\mu f$	C_A IS GREATER THAN $.01\mu f$
$L_I = 10\mu H$	L_A IS GREATER THAN $10\mu H$

CLASS I, DIV. 1, GROUPS C AND D

$V_T = 30V$	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_T = 225mA$	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 225mA
$P_{MAX} = 1 \text{ WATT}$	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{oc} \times I_{sc}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
$C_I = .01\mu f$	C_A IS GREATER THAN $.01\mu f$
$L_I = 10\mu H$	L_A IS GREATER THAN $10\mu H$



HAZARDOUS AREA | NON-HAZARDOUS AREA

ASSOCIATED APPARATUS
(SEE SHEET 3)

OUTPUT CODE A
MODELS INCLUDED
2051C, L, T

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

DR. **Myles Lee Miller**

ISSUED

CAD MAINTAINED (MicroStation)

SIZE A FSCM NO. DWG NO. **02051-1009**

SCALE N/A WT. SHEET 4 OF 13

Form Rev AC

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA				

FOR OUTPUT CODE M

CLASS I, DIV. 1, GROUPS A AND B

$V_{MAX} = 30V$	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_{MAX} = 200mA$	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 200mA
$P_{MAX} = 1 \text{ WATT}$	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
$C_I = .02\mu f$	C_A IS GREATER THAN $.02\mu f$
$L_I = 10\mu H$	L_A IS GREATER THAN $10\mu H$

* FOR T1 OPTION:

$L_I = 0.75mH$	L_A IS GREATER THAN $0.75mH$
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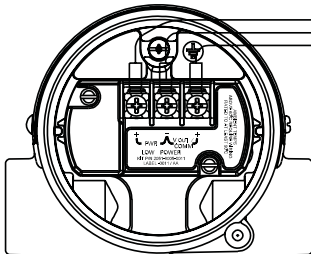
CLASS I, DIV. 1, GROUPS C AND D

$V_{MAX} = 30V$	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_{MAX} = 225mA$	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 225mA
$P_{MAX} = 1 \text{ WATT}$	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
$C_I = .02\mu f$	C_A IS GREATER THAN $.02\mu f$
$L_I = 10\mu H$	L_A IS GREATER THAN $10\mu H$

* FOR T1 OPTION:

$L_I = 0.75mH$	L_A IS GREATER THAN $0.75mH$
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HAZARDOUS AREA



NON-HAZARDOUS AREA

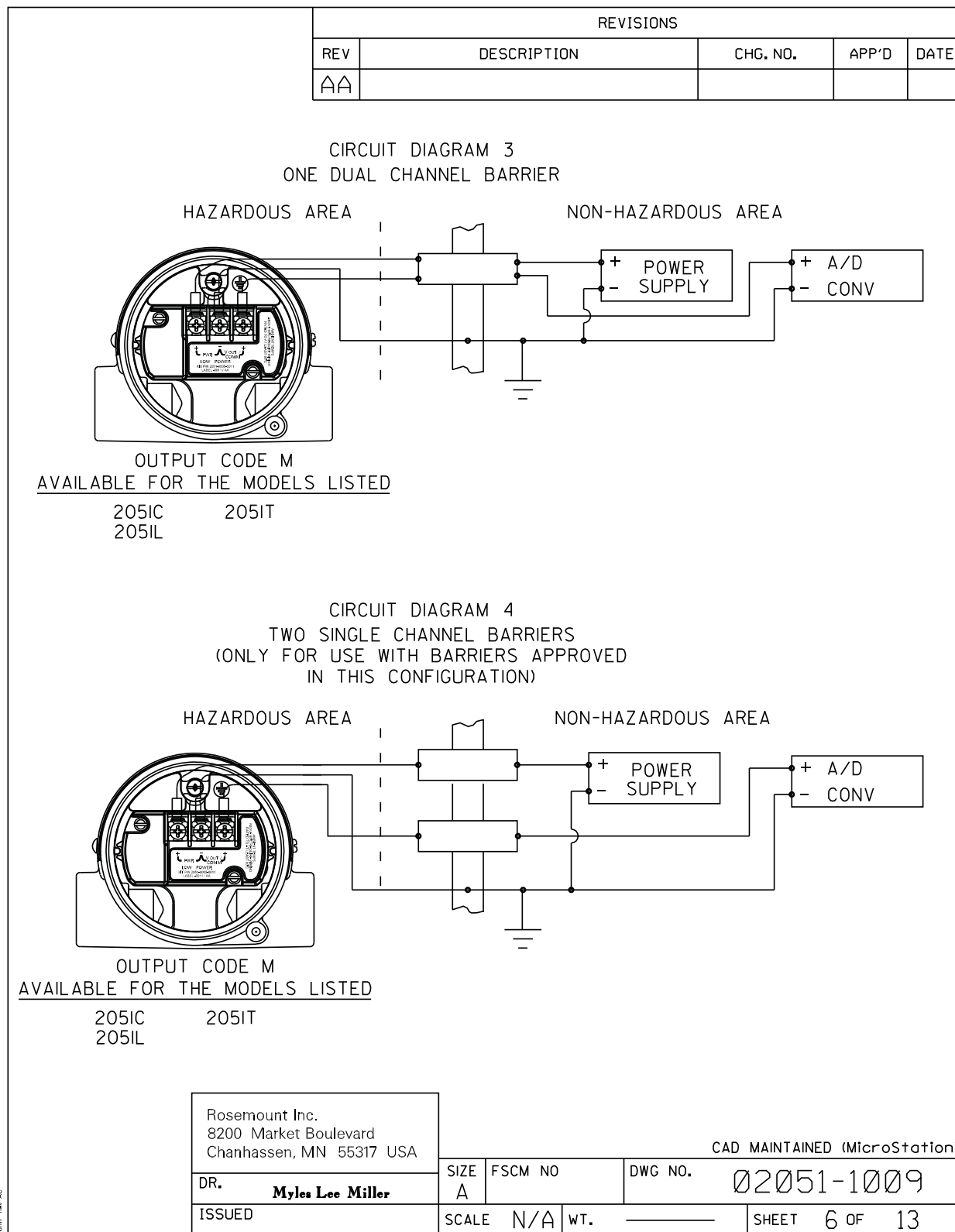
ASSOCIATED APPARATUS

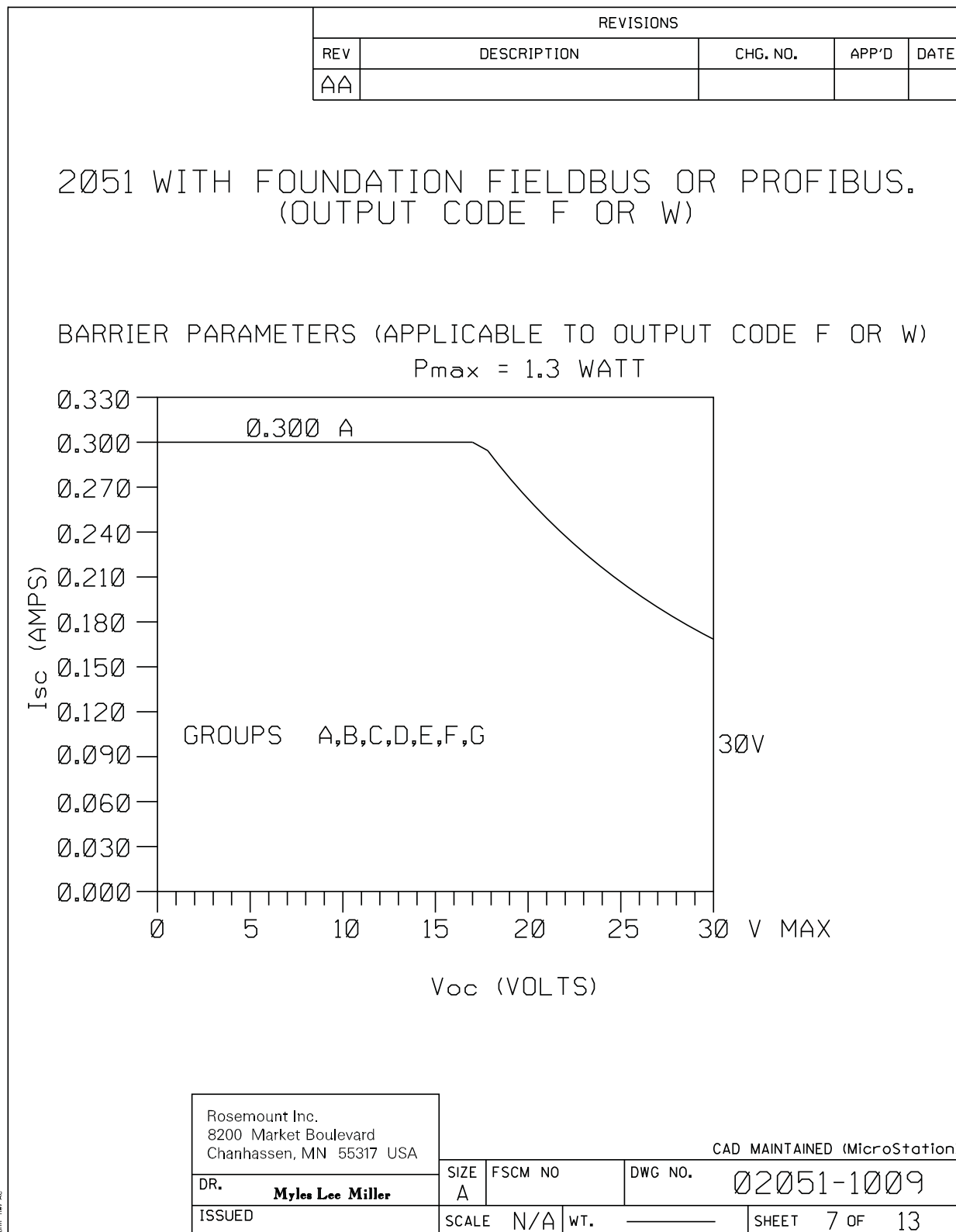
OUTPUT CODE M
AVAILABLE FOR THE MODELS LISTED

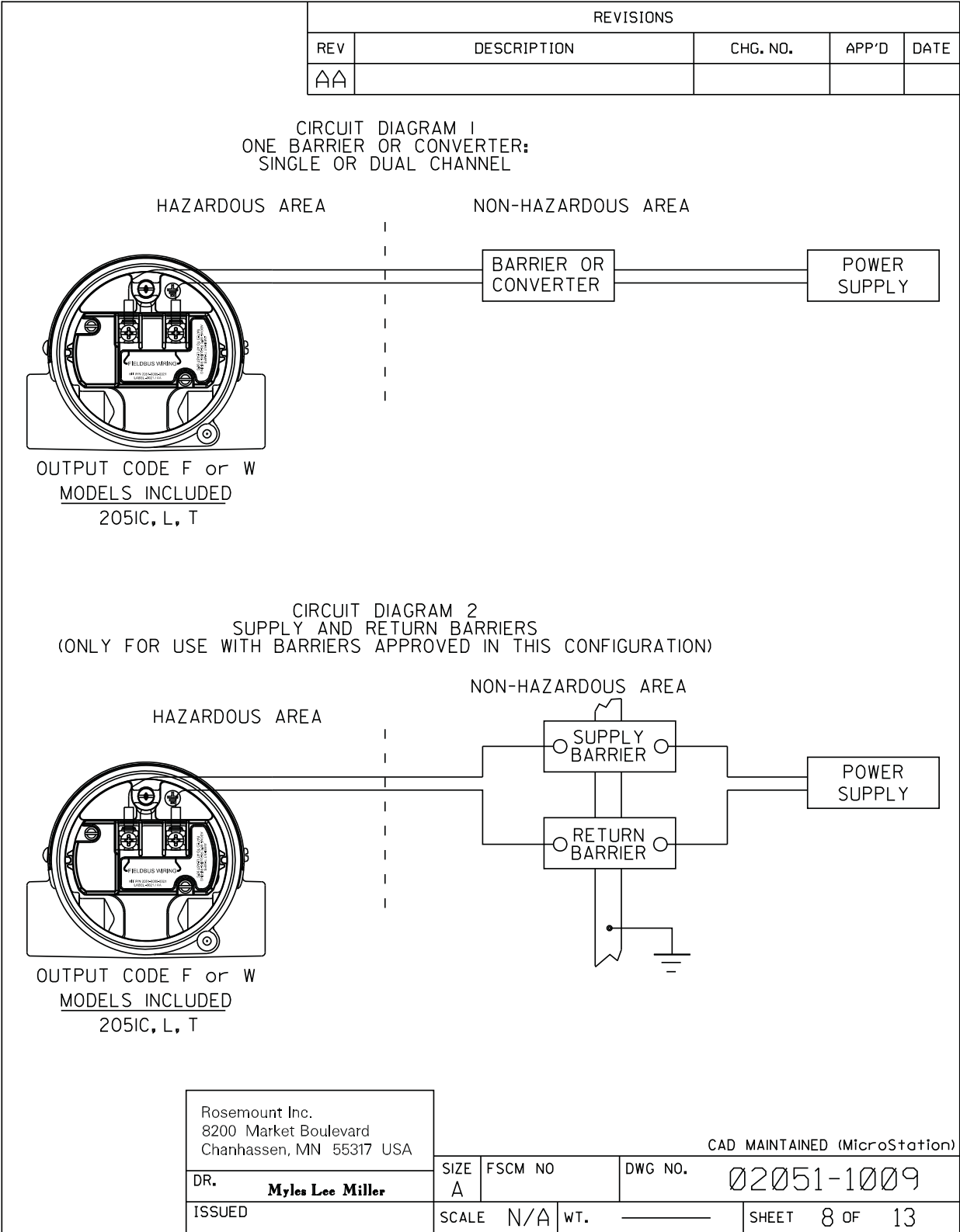
205IC
205IL

205IT

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)	
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED	SCALE N/A	WT. _____	SHEET 5 OF 13







REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA				

ENTITY CONCEPT APPROVALS

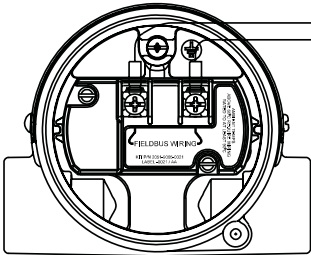
THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (V_{oc} OR V_t) AND MAX. SHORT CIRCUIT CURRENT (I_{sc} OR I_t) AND MAX. POWER ($V_{oc} \times I_{sc}/4$) OR ($V_t \times I_t/4$), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (V_{max}), MAXIMUM SAFE INPUT CURRENT (I_{max}), AND MAXIMUM SAFE INPUT POWER (P_{max}) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (C_a) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_i) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (L_a) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_i) OF THE INTRINSICALLY SAFE APPARATUS.

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

FOR OUTPUT CODE F or W

CLASS I, DIV. 1, GROUPS A, B, C AND D

$V_{MAX} = 30V$	V_T OR V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_{MAX} = 300mA$	I_T OR I_{SC} IS LESS THAN OR EQUAL TO 300mA
$P_{MAX} = 1.3 \text{ WATT}$	$(\frac{V_T \times I_T}{4})$ OR $(\frac{V_{oc} \times I_{sc}}{4})$ IS LESS THAN OR EQUAL TO 1.3 WATT
$C_I = 0\mu f$	C_A IS GREATER THAN $0\mu f$
$L_I = 0\mu H$	L_A IS GREATER THAN $0\mu H$



HAZARDOUS AREA | NON-HAZARDOUS AREA

OUTPUT CODE F
MODELS INCLUDED
2051C, L, T

ASSOCIATED APPARATUS

(SEE SHEET 3)

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

DR. **Myles Lee Miller**

ISSUED

CAD MAINTAINED (MicroStation)

SIZE A	FSCM NO	DWG NO. 02051-1009	
SCALE N/A	WT.		SHEET 9 OF 13

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AA				

FISCO CONCEPT APPROVALS

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. FOR THIS INTERCONNECTION TO BE VALID THE VOLTAGE (U_i or V_{max}), THE CURRENT (I_i or I_{max}), AND THE POWER (P_i or P_{ma}) THAT INTRINSICALLY SAFE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALLY SAFE, INCLUDING FAULTS, MUST BE EQUAL OR GREATER THAN THE VOLTAGE (U_o , V_{oc} , or V_t), THE CURRENT (I_o , I_{sc} , or I_t), AND THE POWER (P_o or P_{max}) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. ALSO, THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND THE INDUCTANCE (L_i) OF EACH APPARATUS (BESIDES THE TERMINATION) CONNECTED TO THE FIELD BUS MUST BE LESS THAN OR EQUAL TO 5nF AND 10μH RESPECTIVELY. ONLY ONE ACTIVE DEVICE IN EACH SECTION (USUALLY THE ASSOCIATED APPARATUS) IS ALLOWED TO CONTRIBUTE THE DESIRED ENERGY FOR THE FIELD BUS SYSTEM. THE ASSOCIATED APPARATUS' VOLTAGE U_o (or V_{oc} or V_t) IS LIMITED TO A RANGE OF 14V TO 24 V.D.C. ALL OTHER EQUIPMENT COMBINED IN THE BUS CABLE MUST BE PASSIVE (THEY CANNOT PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50 μA FOR EACH CONNECTED DEVICE) SEPARATELY POWERED EQUIPMENT REQUIRES A GALVANIC ISOLATION TO AFFIRM THAT THE INTRINSICALLY SAFE FIELD BUS CIRCUIT WILL REMAIN PASSIVE. THE PARAMETER OF THE CABLE USED TO INTERCONNECT THE DEVICES MUST BE IN THE FOLLOWING RANGE:

LOOP RESISTANCE R' : 15...150 OHM/km
 INDUCTANCE PER UNIT LENGTH L' : 0.4...1mH/KM
 CAPACITANCE PER UNLIT LENGTH C' : 80...200nF

$C' = C' \text{ LINE/LINE} + 0.5C' \text{ LINE/SCREEN}$, IF BOTH LINES ARE FLOATING, OR
 $C' = C' \text{ LINE/LINE} + C' \text{ LINE/SCREEN}$, IF THE SCREEN IS CONNECTED TO ONE LINE
 TRUNK CABLE LENGTH: ≤ 1000 m
 SPUR CABLE LENGTH: ≤ 30 m
 SPLICE LENGTH: ≤ 1 m

AN APPROVED INFALLIBLE LINE TERMINATION TO EACH END OF THE TRUNK CABLE, WITH THE FOLLOWING PARAMETERS IS APPROPRIATE:

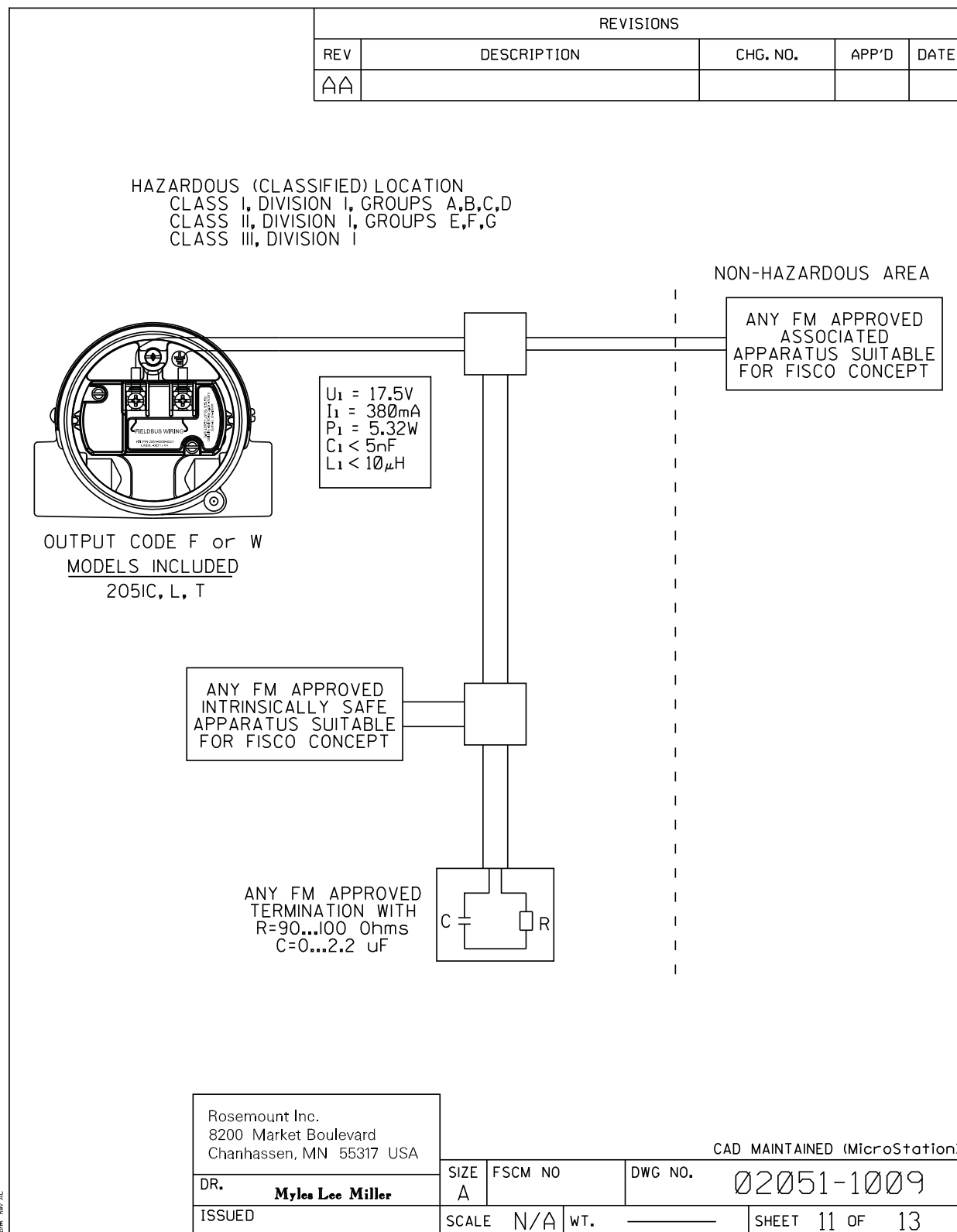
$R = 90...100 \text{ OHMS}$ $C = 2.2\mu F$

AN ALLOWED TERMINATION MIGHT ALREADY BE LINKED IN THE ASSOCIATED APPARATUS. DUE TO I.S. REASONS, THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED. IF THE RULES ABOVE ARE FOLLOWED, UP TO A TOTAL LENGTH OF 1000 m (THE SUMMATION OF TRUNK AND ALL SPUR CABLES), THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT DAMAGE THE INTRINSIC SAFETY OF THE SYSTEM.

NOTES:
INTRINSICALLY SAFE CLASS I, DIV. 1, GROUPS A, B, C, D

1. THE MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 V.
2. CAUTION: ONLY USE SUPPLY WIRES SUITABLE FOR 5°C ABOVE SURROUNDING TEMPERATURE.
3. WARNING: REPLACEMENT OF COMPONENTS MAY DAMAGE INTRINSIC SAFETY.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)		
DR.	Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1009
ISSUED		SCALE	N/A	WT. ———
		SHEET 10 OF		13



		REVISIONS			
REV	DESCRIPTION	CHG. NO.	APP'D	DATE	
AA					

NON-HAZARDOUS LOCATION

NONINCENDIVE FIELD CIRCUIT
CLASS I, DIV. 2 LOCATIONS

DIVISION 2 HAZARDOUS (CLASSIFIED) LOCATION

APPROVED
NONINCENDIVE
SUPPLY

V_{max1}
 C_{I1}
 L_{I1}
 I_{max1}

V_{max2}
 C_{I2}
 L_{I2}
 I_{max2}

V_{max3}
 C_{I3}
 L_{I3}
 I_{max3}

V_{maxN}
 C_{IN}
 L_{IN}
 I_{maxN}

D

D

D

D

WIRING PER NEC® (NFPA 70) 501-4 (b) EXCEPTION (NONINCENDIVE FIELD CIRCUIT)

NFPA 70 National Electrical Code® ARTICLE 501-4(b) EXCEPTION: "WIRING IN NONINCENDIVE CIRCUITS SHALL BE PERMITTED USING ANY OF THE METHODS SUITABLE FOR WIRING IN ORDINARY LOCATIONS."

IN NORMAL OPERATION

DEVICES CONTROL THROUGH-CURRENT

ROSEMOUNT 2051

PARAMETERS	DEVICE		4-20mA/ HART	1-5 VDC/ HART	FIELDBUS (F or W)
V_{oc}	\leq Minimum of (V_{max1} , V_{max2} , ..., V_{maxN})	V_{max}	30v	30v	30v
I_{max1}	$\geq I_{q1} + I_{signal1}$	Maximum normal operating current	22mA	3.1mA	27mA
I_{max2}	$\geq I_{q1} + I_{signal2}$				
.	.				
.	.	C_a	.010uF	.020uF	0uF
.	.	L_a	10uH	10uH	0uH
.	.	L_a w/T1		.75mH	
I_{maxN}	$\geq I_{qN} + I_{signalN}$				
C_a	$\leq C_{I1} + C_{I2} + \dots + C_{IN} + C_{cable}$				
L_a	$\leq L_{I1} + L_{I2} + \dots + L_{IN} + L_{cable}$				
Imax for an individual device = $I_q + I_{signal}$					
I_q = Quiescent current through device (Maximum quiescent current for the device)					
I_{signal} = Signaling current through device (Protocol may limit signaling to one device at a time)					
Operating Imax = $I_{q1} + I_{q2} + \dots + I_{qN} + I_{signal\ max}$					
$I_{signal\ max}$ = Max. of ($I_{signal1}$, $I_{signal2}$, ..., $I_{signalN}$)					

ROSEMOUNT 2051 TRANSMITTERS ARE CURRENT CONTROLLERS ON INDIVIDUAL PARALLEL BRANCHES WITH RESPECT TO THE POWER SUPPLY. IN NONINCENDIVE INSTALLATIONS THE Imax FOR EACH TRANSMITTER IS NOT RELATED TO THE MAXIMUM CURRENT OF THE POWER SUPPLY (Isc) IN THE SAME MANNER AS FOR TRANSMITTER INSTALLED PER I.S. REQUIREMENTS, BECAUSE NONINCENDIVE REQUIREMENTS INCLUDE ONLY NORMAL OPERATING CONDITIONS.

REFERENCE: APPENDIX A7.3 (FM3611)

Rosemount Inc.
8200 Market Boulevard
Chanhassen, MN 55317 USA

CAD MAINTAINED (MicroStation)

DR.	Myles Lee Miller	SIZE	A	FSCM NO		DWG NO.	02051-1009
ISSUED		SCALE	N/A	WT.		SHEET	12 OF 13


		REVISIONS			
REV	DESCRIPTION	CHG. NO.	APP'D	DATE	
AA					

NOTES:

1. NO REVISION TO THIS DRAWING WITHOUT PRIOR FM APPROVAL.
2. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
3. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
4. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms or Vdc.
5. RESISTANCE BETWEEN INTRINSICALLY SAFE GROUND AND EARTH GROUND MUST BE LESS THAN 1.0 OHM.
6. INSTALLATION SHOULD BE IN ACCORDANCE WITH ANSI/ISA-RP12.06.01 "INSTALLATION OF INTRINSICALLY SAFE SYSTEMS FOR HAZARDOUS (CLASSIFIED) LOCATIONS" AND THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70).
7. THE ASSOCIATED APPARATUS MUST BE FM APPROVED.
8. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
9. THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:
 V_{max} or U_i IS GREATER THAN or EQUAL TO V_{oc} , V_t or U_o
 I_{max} or I_i IS GREATER THAN or EQUAL TO I_{sc} , I_t or I_o
 P_{max} or P_i IS GREATER THAN or EQUAL TO P_o
 C_a IS GREATER THAN or EQUAL TO THE SUM OF ALL C_i 's PLUS C_{cable}
 L_a IS GREATER THAN or EQUAL TO THE SUM OF ALL L_i 's PLUS L_{cable}
10. WARNING - TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERES, DISCONNECT POWER BEFORE SERVICING.
11. THE ASSOCIATED APPARATUS MUST BE A RESISTIVELY LIMITED SINGLE OR MULTIPLE CHANNEL FM APPROVED BARRIER HAVING PARAMETERS LESS THAN THOSE QUOTED, AND FOR WHICH THE OUTPUT AND THE COMBINATIONS OF OUTPUTS IS NON-IGNITION CAPABLE FOR THE CLASS, DIVISION AND GROUP OF USE.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)			
DR.	Myles Lee Miller	SIZE A	FSCM NO	DWG NO.	02051-1009
ISSUED		SCALE	N/A	WT.	SHEET 13 OF 13

Canadian Standards Association (CSA)

CONFIDENTIAL AND PROPRIETARY INFORMATION IS CONTAINED HEREIN AND MUST BE HANDLED ACCORDINGLY	REVISIONS				
	REV	DESCRIPTION	CHG. NO.	APP'D	DATE
	AA	NEW RELEASE	RTC1025889	J.G.K.	4/21/08
	AB	UPDATE PER CSA REQUIREMENT	RTC1026355	J.G.K.	6/18/08
<p style="text-align: center;"> APPROVALS FOR 2051C 2051L 2051T </p> <p style="text-align: center;"> OUTPUT CODE A (4-20 mA HART) I.S. SEE SHEETS 2-3 OUTPUT CODE M (LOW POWER) I.S. SEE SHEETS 3-4 OUTPUT CODE F/W (FIELDBUS) I.S. SEE SHEETS 5-7 OUTPUT CODES A,F,W I.S. ENTITY PARAMETERS SHEET 8-9 </p> <p style="text-align: center;"> TO ASSURE AN INTRINSICALLY SAFE SYSTEM, THE TRANSMITTER AND BARRIER MUST BE WIRED IN ACCORDANCE WITH THE BARRIER MANUFACTURER'S FIELD WIRING INSTRUCTIONS AND THE APPLICABLE CIRCUIT DIAGRAM. </p> <p style="text-align: center;"> WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION I. </p> <p style="text-align: center;"> AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE I, DIVISION I. </p>					
CAD MAINTAINED (MicroStation)					
UNLESS OTHERWISE SPECIFIED DIMENSIONS IN INCHES [mm]. REMOVE ALL BURRS AND SHARP EDGES. MACHINE SURFACE FINISH 125	CONTRACT NO.		 ROSEMOUNT® 8200 Market Boulevard • Chanhassen, MN 55317 USA		
	DR. Myles Lee Miller 4/15/08				
	CHK'D		TITLE INDEX OF I.S. CSA FOR 2051C/L/T		
	APP'D.				
-TOLERANCE- .X ± .1 [2,5] .XX ± .02 [0,5] .XXX ± .010 [0,25] FRACTIONS ANGLES ± 1/32 ± 2°		SIZE A	FSCM NO	DWG NO.	02051-1008
DO NOT SCALE PRINT		SCALE N/A		WT.	SHEET 1 OF 9

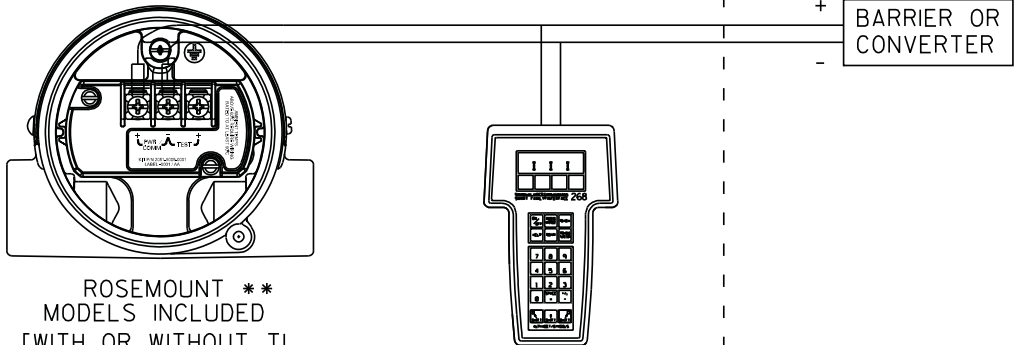
REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB				

CSA INTRINSIC SAFETY APPROVALS
CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

Ex ia
INTRINSICALLY SAFE/SECURITE INTRINSEQUE
4-20 mA, ("A" OUTPUT CODE)

HAZARDOUS AREA

NON-HAZARDOUS AREA



ROSEMOUNT **
MODELS INCLUDED
[WITH OR WITHOUT TI
(TRANSIENT PROTECTION) OPTION]
2051C, L, T

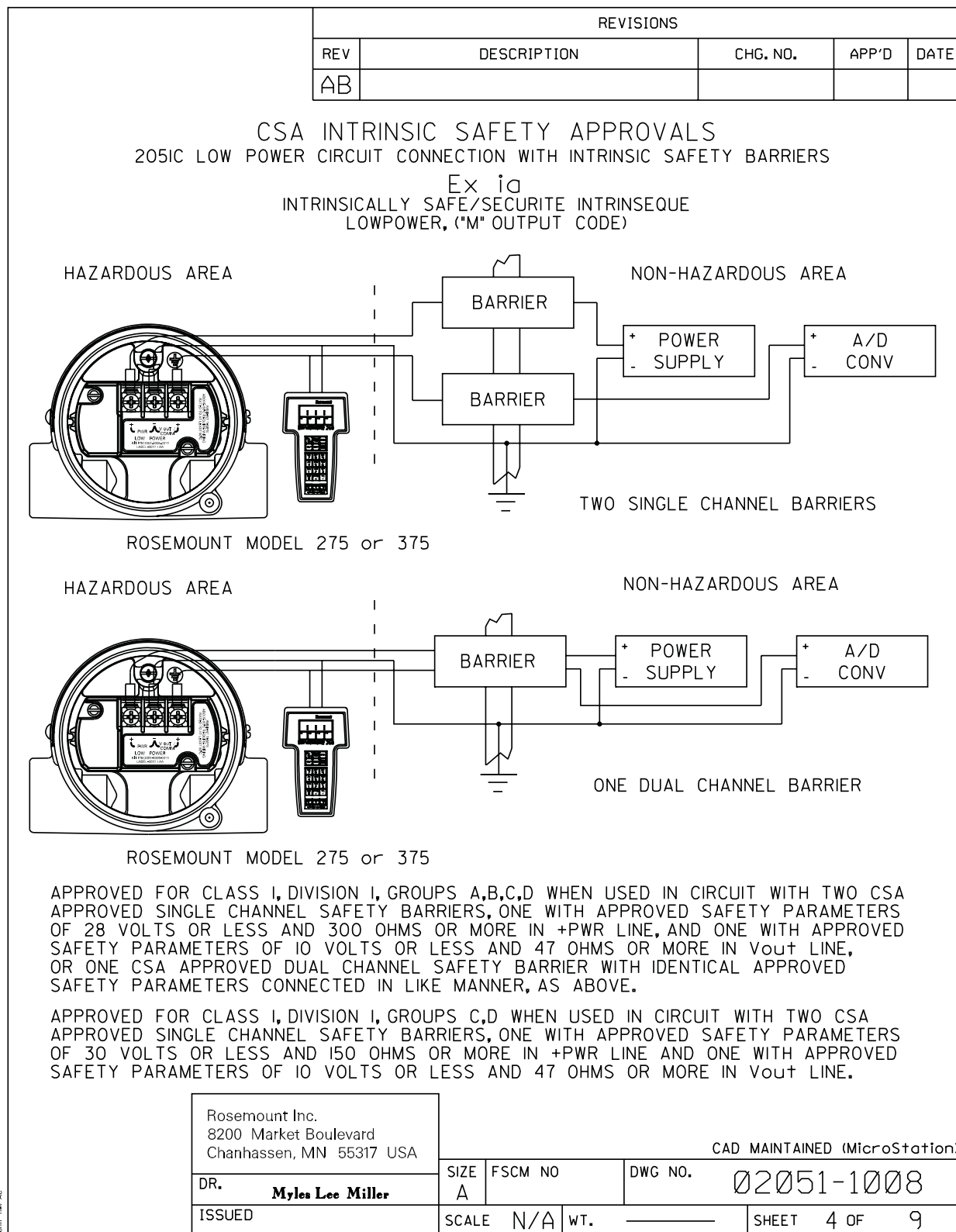
ROSEMOUNT
MODEL 275 or 375 SMART
FAMILY INTERFACE

** FOR THE LOW POWER OPTION, SEE PAGE 4 FOR THE CIRCUIT CONNECTION WITH BARRIER OR CONVERTER. FOR FIELDBUS OPTIONS("F" or "W" OUTPUT CODE), SEE PAGE 5 FOR PARAMETERS AND CIRCUIT CONNECTION TO BARRIER.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)	
DR. Myles Lee Miller 4/15/08	SIZE A	FSCM NO	DWG NO. 02051-1008
ISSUED	SCALE N/A	WT.	SHEET 2 OF 9

		REVISIONS				
		REV	DESCRIPTION	CHG. NO.	APP'D	DATE
		AB				
4-20 mA, ("A" OUTPUT CODE)						
DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I				
CSA APPROVED SAFETY BARRIER	30 V OR LESS * 330 OHMS OR MORE * 28 V OR LESS * 300 OHMS OR MORE 25 V OR LESS 200 OHMS OR MORE * 22 V OR LESS * 180 OHMS OR MORE	GROUPS A, B, C, D				
FOXBORO CONVERTER 2AI-I2V-CGB, 2AI-I3V-CGB, 2AS-I3I-CGB, 3A2-I2D-CGB, 3A2-I3D-CGB, 3AD-I3I-CGB, 3A4-I2D-CGB, 2AS-I2I-CGB, 3F4-I2DA		GROUPS B, C, D				
CSA APPROVED SAFETY BARRIER	30 V OR LESS 150 OHMS OR MORE	GROUPS C, D				
LOW POWER, ("M" OUTPUT CODE)						
DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I				
CSA APPROVED SAFETY BARRIER	Supply $\leq 28V, \geq 300 \Omega$ Return $\leq 10V, \geq 47 \Omega$ Supply $\leq 30V, \geq 150 \Omega$ Return $\leq 10V, \geq 47 \Omega$	GROUPS A, B, C, D				
		GROUPS C, D				
* MAY BE USED WITH ROSEMOUNT MODEL 275 or 375 SMART FAMILY INTERFACE.						
Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)				
DR. Myles Lee Miller	SIZE A	FSCM NO	DWG NO. 02051-1008			
ISSUED	SCALE N/A	WT. _____	SHEET 3 OF 9			

Form Rev AC



REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB				

FIELDBUS, ("F" or "W" OUTPUT CODE)

DEVICE	PARAMETERS	APPROVED FOR CLASS I, DIV.I
CSA APPROVED SAFETY BARRIER	30 V OR LESS	GROUPS A, B, C, D
	300 OHMS OR MORE	
	28 V OR LESS	
	235 OHMS OR MORE	
	25 V OR LESS	
	160 OHMS OR MORE	
	22 V OR LESS	
	100 OHMS OR MORE	

CSA INTRINSIC SAFETY APPROVALS
CIRCUIT CONNECTION WITH BARRIER OR CONVERTER

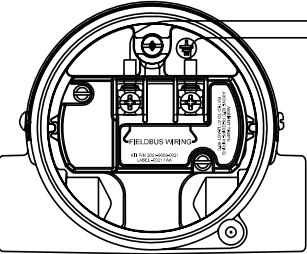
Ex ia
INTRINSICALLY SAFE/SECURITE INTRINSEQUE
FIELDBUS, ("F" or "W" OUTPUT CODE)

HAZARDOUS AREA

NON-HAZARDOUS AREA

+ BARRIER OR CONVERTER

-



ROSEMOUNT **
MODELS INCLUDED
[WITH OR WITHOUT TI
(TRANSIENT PROTECTION) OPTION]
2051C, L, T

WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS
MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION I.

AVERTISSEMENT - RISQUE D'EXPLOSION - LA SUBSTITUTION DE COMPOSANTS
PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS
DE CLASSE I, DIVISION I.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)		
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ISSUED	SCALE	N/A	WT.	SHEET 5 OF 9

REVISIONS				
REV	DESCRIPTION	CHG. NO.	APP'D	DATE
AB				

FISCO CONCEPT APPROVALS

THE FISCO CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIALLY EXAMINED IN SUCH COMBINATION. FOR THIS INTERCONNECTION TO BE VALID THE VOLTAGE (U_i or V_{max}), THE CURRENT (I_i or I_{max}), AND THE POWER (P_i or P_{ma}) THAT INTRINSICALLY SAFE APPARATUS CAN RECEIVE AND REMAIN INTRINSICALLY SAFE, INCLUDING FAULTS, MUST BE EQUAL OR GREATER THAN THE VOLTAGE (U_o , V_{oc} , or V_t), THE CURRENT (I_o , I_{sc} , or I_t), AND THE POWER (P_o or P_{max}) LEVELS WHICH CAN BE DELIVERED BY THE ASSOCIATED APPARATUS, CONSIDERING FAULTS AND APPLICABLE FACTORS. ALSO, THE MAXIMUM UNPROTECTED CAPACITANCE (C_i) AND THE INDUCTANCE (L_i) OF EACH APPARATUS (BESIDES THE TERMINATION) CONNECTED TO THE FIELD BUS MUST BE LESS THAN OR EQUAL TO 5nF AND 10μH RESPECTIVELY. ONLY ONE ACTIVE DEVICE IN EACH SECTION (USUALLY THE ASSOCIATED APPARATUS) IS ALLOWED TO CONTRIBUTE THE DESIRED ENERGY FOR THE FIELD BUS SYSTEM. THE ASSOCIATED APPARATUS' VOLTAGE U_o (or V_{oc} or V_t) IS LIMITED TO A RANGE OF 14V TO 24 V.D.C. ALL OTHER EQUIPMENT COMBINED IN THE BUS CABLE MUST BE PASSIVE (THEY CANNOT PROVIDE ENERGY TO THE SYSTEM, EXCEPT A LEAKAGE CURRENT OF 50 μA FOR EACH CONNECTED DEVICE) SEPARATELY POWERED EQUIPMENT REQUIRES A GALVANIC ISOLATION TO AFFIRM THAT THE INTRINSICALLY SAFE FIELD BUS CIRCUIT WILL REMAIN PASSIVE. THE PARAMETER OF THE CABLE USED TO INTERCONNECT THE DEVICES MUST BE IN THE FOLLOWING RANGE:

LOOP RESISTANCE R' : 15...150 OHM/km
 INDUCTANCE PER UNIT LENGTH L' : 0.4...1mH/KM
 CAPACITANCE PER UNLIT LENGTH C' : 80...200nF

$C' = C' \text{ LINE/LINE} + 0.5C' \text{ LINE/SCREEN}$, IF BOTH LINES ARE FLOATING, OR
 $C' = C' \text{ LINE/LINE} + C' \text{ LINE/SCREEN}$, IF THE SCREEN IS CONNECTED TO ONE LINE

TRUNK CABLE LENGTH: ≤ 1000 m
 SPUR CABLE LENGTH: ≤ 30 m
 SPLICE LENGTH: ≤ 1 m

AN APPROVED INFALLIBLE LINE TERMINATION TO EACH END OF THE TRUNK CABLE, WITH THE FOLLOWING PARAMETERS IS APPROPRIATE:

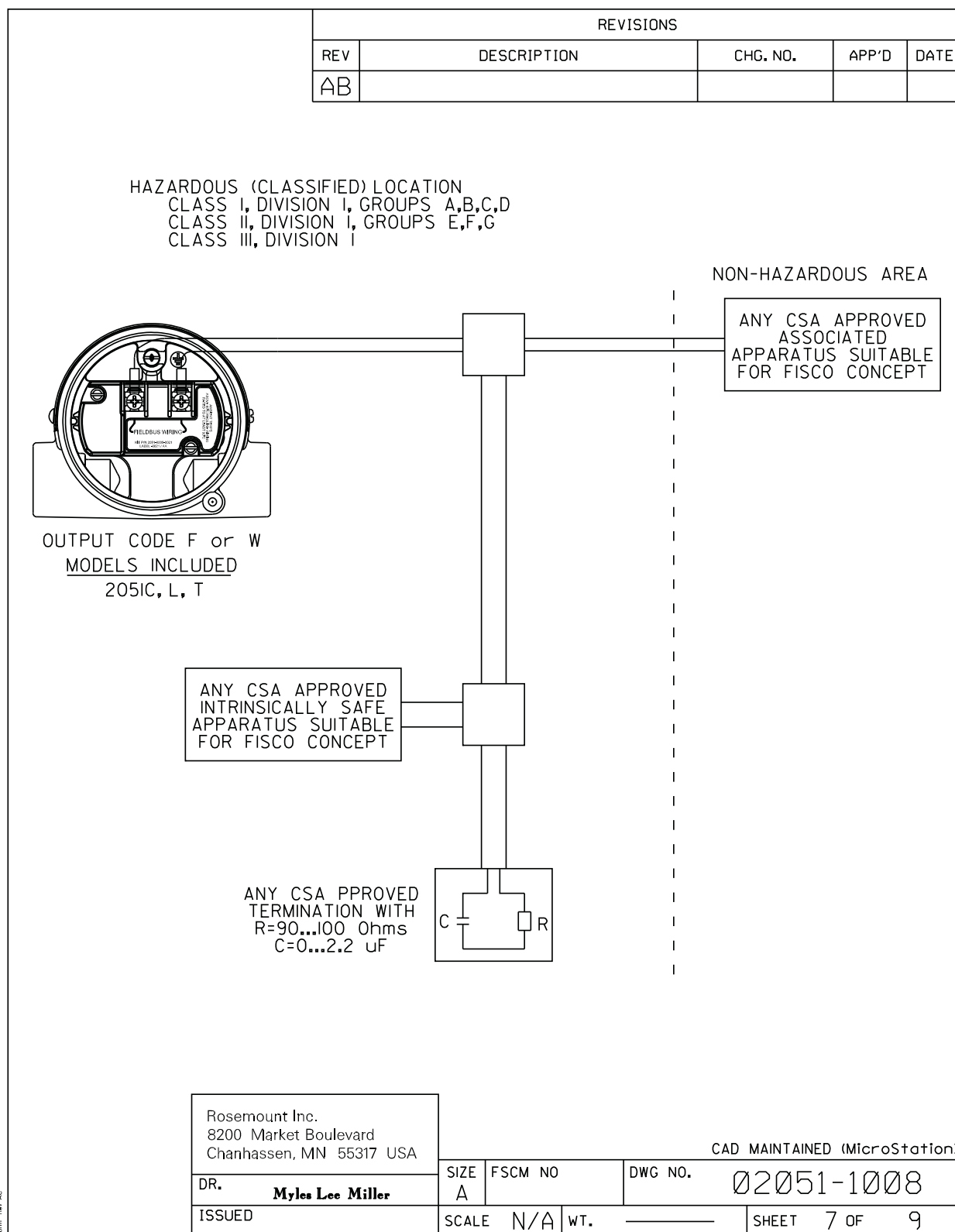
$R = 90...100 \text{ OHMS}$ $C = 2.2\mu F$

AN ALLOWED TERMINATION MIGHT ALREADY BE LINKED IN THE ASSOCIATED APPARATUS. DUE TO I.S. REASONS, THE NUMBER OF PASSIVE APPARATUS CONNECTED TO THE BUS SEGMENT IS NOT LIMITED. IF THE RULES ABOVE ARE FOLLOWED, UP TO A TOTAL LENGTH OF 1000 m (THE SUMMATION OF TRUNK AND ALL SPUR CABLES), THE INDUCTANCE AND THE CAPACITANCE OF THE CABLE WILL NOT DAMAGE THE INTRINSIC SAFETY OF THE SYSTEM.

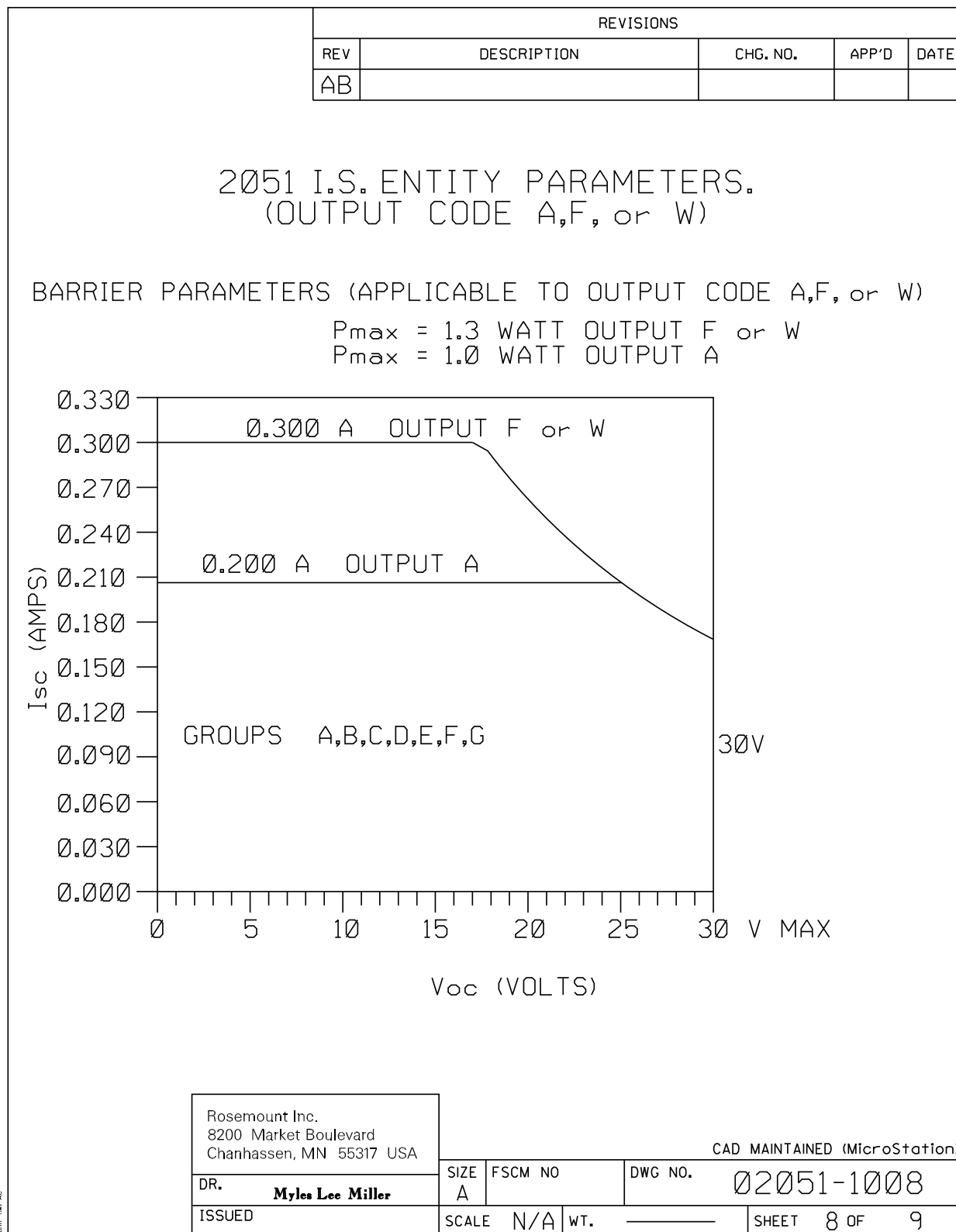
NOTES:
INTRINSICALLY SAFE CLASS I, DIV. 1, GROUPS A, B, C, D

1. THE MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 V.
2. CAUTION: ONLY USE SUPPLY WIRES SUITABLE FOR 5°C ABOVE SURROUNDING TEMPERATURE.
3. WARNING: REPLACEMENT OF COMPONENTS MAY DAMAGE INTRINSIC SAFETY.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA		CAD MAINTAINED (MicroStation)	
DR.	Myles Lee Miller	SIZE A	FSCM NO. DWG NO. 02051-1008
ISSUED	SCALE	N/A	WT. SHEET 6 OF 9



Form Rev A/C



REVISIONS				
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AB				

ENTITY CONCEPT APPROVALS

THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS TO ASSOCIATED APPARATUS NOT SPECIFICALLY EXAMINED IN COMBINATION AS A SYSTEM. THE APPROVED VALUES OF MAX. OPEN CIRCUIT VOLTAGE (V_{OC}) AND MAX. SHORT CIRCUIT CURRENT (I_{SC}) AND MAX. POWER ($V_{OC} \times I_{SC}/4$), FOR THE ASSOCIATED APPARATUS MUST BE LESS THAN OR EQUAL TO THE MAXIMUM SAFE INPUT VOLTAGE (V_{MAX}), MAXIMUM SAFE INPUT CURRENT (I_{MAX}), AND MAXIMUM SAFE INPUT POWER (P_{MAX}) OF THE INTRINSICALLY SAFE APPARATUS. IN ADDITION, THE APPROVED MAX. ALLOWABLE CONNECTED CAPACITANCE (C_A) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE CAPACITANCE AND THE UNPROTECTED INTERNAL CAPACITANCE (C_I) OF THE INTRINSICALLY SAFE APPARATUS, AND THE APPROVED MAX. ALLOWABLE CONNECTED INDUCTANCE (L_A) OF THE ASSOCIATED APPARATUS MUST BE GREATER THAN THE SUM OF THE INTERCONNECTING CABLE INDUCTANCE AND THE UNPROTECTED INTERNAL INDUCTANCE (L_I) OF THE INTRINSICALLY SAFE APPARATUS.

FOR OUTPUT CODE A
CLASS I, DIV. 1, GROUPS A, B, C AND D: CLASS I, ZONE 0, GROUP IIC

$V_T = 30V$	V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_T = 200mA$	I_{SC} IS LESS THAN OR EQUAL TO 200mA
$P_{MAX} = 1 \text{ WATT}$	$(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
$C_I = .01\mu f$	C_A IS GREATER THAN $.01\mu f + C \text{ CABLE}$
$L_I = 10\mu H$	L_A IS GREATER THAN $10\mu H + L \text{ CABLE}$

FOR OUTPUT CODE F or W
CLASS I, DIV. 1, GROUPS A, B, C AND D: CLASS I, ZONE 0, GROUP IIC

$V_T = 30V$	V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_T = 300mA$	I_{SC} IS LESS THAN OR EQUAL TO 300mA
$P_{MAX} = 1.3 \text{ WATT}$	$(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1.3 WATT
$C_I = 0\mu f$	C_A IS GREATER THAN $0\mu f + C \text{ CABLE}$
$L_I = 0\mu H$	L_A IS GREATER THAN $0\mu H + L \text{ CABLE}$

FOR OUTPUT CODE M
CLASS I, DIV. 1, GROUPS A, B, C AND D: CLASS I, ZONE 0, GROUP IIC

$V_T = 30V$	V_{OC} IS LESS THAN OR EQUAL TO 30V
$I_T = 200mA$	I_{SC} IS LESS THAN OR EQUAL TO 200mA
$P_{MAX} = 1 \text{ WATT}$	$(\frac{V_{OC} \times I_{SC}}{4})$ IS LESS THAN OR EQUAL TO 1 WATT
$C_I = .02\mu f$	C_A IS GREATER THAN $.01\mu f + C \text{ CABLE}$
$L_I = 10\mu H$	L_A IS GREATER THAN $10\mu H + L \text{ CABLE}$

* FOR T1 OPTION:

$L_I = 0.75mH$	
----------------	--

NOTE: ENTITY PARAMETERS LISTED APPLY ONLY TO ASSOCIATED APPARATUS WITH LINEAR OUTPUT.

Rosemount Inc. 8200 Market Boulevard Chanhassen, MN 55317 USA	CAD MAINTAINED (MicroStation)								
DR. Myles Lee Miller ISSUED	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">SIZE A</td> <td style="width: 20%;">FSCM NO</td> <td style="width: 25%;">DWG NO. 02051-1008</td> <td style="width: 40%;"></td> </tr> <tr> <td>SCALE N/A</td> <td>WT.</td> <td></td> <td>SHEET 9 OF 9</td> </tr> </table>	SIZE A	FSCM NO	DWG NO. 02051-1008		SCALE N/A	WT.		SHEET 9 OF 9
SIZE A	FSCM NO	DWG NO. 02051-1008							
SCALE N/A	WT.		SHEET 9 OF 9						

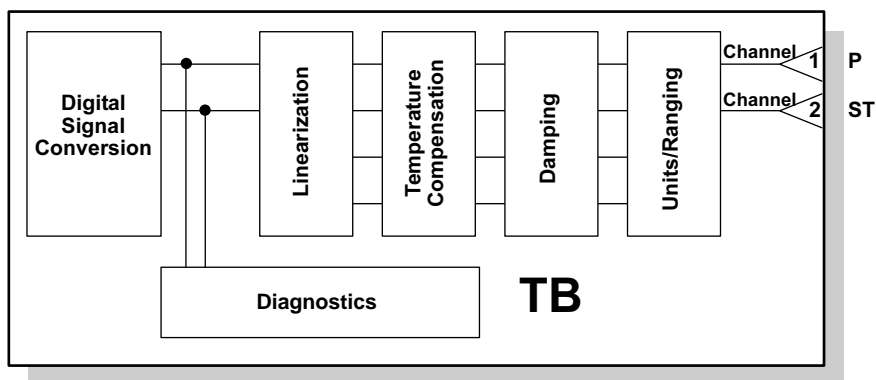
Appendix C Block Information

TRANSDUCER BLOCK

Overview

This section contains information on the 2051 Transducer Block (TB). Descriptions of all Transducer Block parameters, errors, and diagnostics are listed. Also, the modes, alarm detection, status handling, application information, and troubleshooting are discussed.

Figure C-1. Transducer Block Diagram



Definition

The transducer block contains the actual measurement data, including a pressure and temperature reading. Channels 1–2 are assigned to these measurements (see Figure C-1 above). The transducer block includes information about sensor type, engineering units, linearization, reranging, temperature compensation, and diagnostics.

Channel Definitions

Each input has a channel assigned to it allowing the AI block to link to it. The channels for the Rosemount 2051 are the following:

1. P (Pressure)⁽¹⁾
2. ST (Sensor Temperature)

(1) Can be either a DP, gage, or absolute pressure.

Parameters and Descriptions

Parameter	Index Number	Description
ALERT_KEY	04	The identification number of the plant unit.
BLOCK_ALM	08	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
BLOCK_ERR	06	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
CAL_MIN_SPAN	18	The minimum calibration span value allowed. This minimum span information is necessary to ensure when calibration is done, the two calibrated points are not too close together.
CAL_POINT_HI	16	The highest calibrated value.
CAL_POINT_LO	17	The lowest calibrated value.
CAL_UNIT	19	The device description engineering units code index for the calibration values. Valid calibration units are the following: 1130 = Pa 1133 = kPa 1137 = bar 1138 = mbar 1139 = torr 1140 = atm 1141 = psi 1144 = g/cm ² 1145 = kg/cm ² 1148 = inH ₂ O @ 68 °F 1151 = mmH ₂ O @ 68 °F 1154 = ftH ₂ O @ 68 °F 1156 = inHg @ 0 °C 1158 = mmHg @ 0 °C
COLLECTION_DIRECTORY	12	A directory that specifies the number, starting indices, and DD Item ID's of the data collections in each transducer within a transducer block.
FACT_CAL_RECALL	33	Recalls the sensor calibration set at the factory.
MODE_BLK	05	The actual, target, permitted, and normal modes of the block. Target: The mode to "go to" Actual: The mode the "block is currently in" Permitted: Allowed modes that target may take on Normal: Most common mode for target
MODULE_TYPE	34	Indicates the type of sensor module. 0 = Standard coplanar (C) 1 = Standard threaded (T) 2 = Level Coplanar (L) 3 = Reference class coplanar (P) 4 = High temp. conventional (H) 252 = Unknown
PRIMARY_VALUE	14	The measured value and status available to the function block.

Parameter	Index Number	Description
PRIMARY_VALUE_RANGE	15	The high and low range limit values, the engineering unit code, and the number of digits to the right of the decimal point to be used to display the final value. Valid engineering units are the following: 1130 = Pa 1133 = kPa 1137 = bar 1138 = mbar 1139 = torr 1140 = atm 1141 = psi 1144 = g/cm ² 1145 = kg/cm ² 1148 = inH ₂ O @ 68 °F 1151 = mmH ₂ O @ 68 °F 1154 = ftH ₂ O @ 68 °F 1156 = inHg @ 0 °C 1158 = mmHg @ 0 °C
PRIMARY_VALUE_TYPE	13	Type of measurement represented by the primary value. 107 = Differential pressure 108 = Gage pressure 109 = Absolute pressure
SECONDARY_VALUE	29	The secondary value, related to the sensor.
SECONDARY_VALUE_UNIT	30	Engineering units to be used with SECONDARY_VALUE. 1001 °C 1002 °F
SENSOR_CAL_DATE	25	The last date on which the calibration was performed. This is intended to reflect the calibration of that part of the sensor that is usually wetted by the process.
SENSOR_CAL_LOC	24	The last location of the sensor calibration. This describes the physical location at which the calibration was performed.
SENSOR_CAL_METHOD	23	The last method used to calibrate the device. 103 = factory trim standard 104 = user trim standard
SENSOR_CAL_TYPE	35	The type of last sensor calibration. 0 = Differential pressure 1 = Gage pressures 2 = Absolute pressure 252 = Unknown
SENSOR_CAL_WHO	26	The name of the person responsible for the last sensor calibration.
SENSOR_FILL_FLUID	28	Type of fill fluid used in sensor. 0 = Undefined 1 = Silicone 2 = Inert 3 = Undefined 7 = Neobee 251 = "None" 252 = "Unknown" 253 = "Special"
SENSOR_ISOLATOR_MTL	27	Defines the construction material for the isolating diaphragms. 2 = 316 Stainless Steel 3 = Hastelloy C™ 4 = Monel 5 = Tantalum 253 = "Special"
SENSOR_RANGE	21	The high and low range limit values, the engineering units code, and the number of digits to the right of the decimal point for the sensor.
SENSOR_SN	22	Serial number of the sensor.

Parameter	Index Number	Description
SENSOR_TYPE	20	Type of sensor connected with the transducer block. Valid sensor types are the following: 117 = Capacitance 124 = Strain Gauge
ST_REV	01	The revision level of the static data associated with the function block.
STRATEGY	03	The strategy field can be used to identify grouping of blocks.
TAG_DESC	02	The user description of the intended application of the block.
TB_DETAILED_STATUS	31	Indicates the state of the transmitter. The parameter contains specific codes relating to the transducer block and the pressure sensor specifically.
TRANSDUCER_DIRECTORY	09	Directory that specifies the number and starting indices of the transducers in the transducer block.
TRANSDUCER_TYPE	10	Identifies the transducer that follows. 100 = Standard pressure with calibration
UPDATE_EVT	07	This alert is generated by any change to the static data.
XD_ERROR	11	Provides additional error codes related to transducer blocks.

Block/Transducer Errors

The following conditions are reported in the BLOCK_ERR and XD_ERROR parameters. Conditions in bold type are available. Conditions in italics are inactive for the Transducer block and are given here only for your reference.

Condition Number	Condition Name and Description
0	Other
1	Block Configuration Error
2	Link Configuration Error
3	Simulate Active
4	Local Override
5	Device Fault State Set
6	Device Needs Maintenance Soon
7	Input failure/process variable has bad status
8	Output Failure
9	Memory Failure
10	Lost Static Data
11	Lost NV Data
12	Readback Check Failed
13	Device Needs Maintenance Now
14	Power Up: The device was just powered-up.
15	Out of Service: The actual mode is out of service.
17	General Error: A general error that cannot be specified below occurred
20	Electronics Failure: An electrical component failed.
22	I/O Failure: An I/O failure occurred.
23	Data Integrity Error: Data stored in the device is no longer valid due to a non-volatile memory checksum failure, a data verify after write failure, etc.
25	Algorithm Error: The algorithm used in the transducer block produced an error due to overflow, data reasonableness failure, etc.

Diagnostics

In addition to the BLOCK_ERR and XD_ERROR parameters, more detailed information on the measurement status can be obtained via TB_DETAILED_STATUS. The table below lists the potential errors and the possible corrective actions for the given values. The corrective actions are in order of increasing system level compromises. The first step should always be to reset the transmitter and then if the error persists, try the steps in the table below. Start with the first corrective action and then try the second.

Value	Description	Corrective Actions
0x00000001	Sensor hardware incompatible with software	1. Restart Processor 2. Send to Service Center
0x00000002	Sensor board EEPROM burn failure	1. Restart the Processor
0x00000004	Sensor board EEPROM not initialized with factory data	1. Restart Processor 2. Send to Service Center
0x00000008	Temperature sensor not updating	1. Restart Processor 2. Reconnect sensor ribbon cable 3. Send to Service Center
0x00000010	Pressure sensor not updating	1. Restart Processor 2. Reconnect sensor ribbon cable 3. Send to Service Center
0x00000080	Sensor EEPROM Checksum failure	1. Restart Processor 2. Send to Service Center
0x00000100	Pressure sensor HI limit exceeded	1. Check Pressure 2. Restart Processor
0x00000200	Pressure sensor LO limit exceeded	1. Check Pressure 2. Restart Processor
0x00001000	Temperature sensor HI limit exceeded	1. Check Ambient Temp. 2. Restart Processor
0x00004000	Temperature SECONDARY_VALUE range exceeded	1. Check Ambient Temp. 2. Restart Processor

Modes

The transducer block supports two modes of operation as defined by the MODE_BLK Parameter:

Automatic (Auto)—The channel outputs reflect the analog input measurement.

Out of Service (OOS)—Channel outputs status is set to Bad: Out of Service for each channel. The BLOCK_ERR parameter shows Out of Service. In this mode, you can make changes to all configurable parameters. The target mode of a block may be restricted to one or more of the supported modes.

Alarm Detection

Alarms are not generated by the transducer block. By correctly handling the status of the channel values, the down stream block (AI) will generate the necessary alarms for the measurement. The error that generated this alarm can be determined by looking at BLOCK_ERR and XD_ERROR and TB_DETAILED_STATUS.

Status Handling

Normally, the status of the output channels reflects the status of the measurement value, the operating condition of the measurement electronics, and any active alarm condition.

In Auto mode, PRIMARY_VALUE reflects the value and status quality of the output channels.

Methods

Sensor Calibration

In order to calibrate the sensor, the following steps are performed by the user calibration method:

1. Set MODE_BLK.TARGET = OOS.
2. Apply desired pressure (low pressure); allow to stabilize. Pressure applied must be between range limits defined in PRIMARY_VALUE_RANGE.
3. Set CAL_POINT_LO to applied pressure.
4. Apply desired pressure (high pressure); allow to stabilize. Pressure applied must be between range limits defined in PRIMARY_VALUE_RANGE and greater than CAL_POINT_LO + CAL_MIN_SPAN.
5. Set CAL_POINT_HI to applied pressure.
6. Set SENSOR_CAL_DATE to current date.
7. Set SENSOR_CAL_WHO to person responsible for calibration.
8. Set SENSOR_CAL_LOC to calibration location.
9. Set MODE_BLK.TARGET = AUTO.

Troubleshooting

Refer to the table below to troubleshoot any problems encountered.

Symptom	Possible Causes	Corrective Action
Mode will not leave OOS	Target mode not set.	Set target mode to something other than OOS.
	Detailed status error	See "Diagnostics" on page C-5
	Resource block	The actual mode of the Resource block is OOS. See Resource Block Diagnostics for corrective action.
Pressure or Sensor Temperature Status is BAD	Measurement or Device Error	See "Diagnostics" on page C-5

RESOURCE BLOCK

Overview

This section contains information on the Rosemount 2051 Resource Block. Descriptions of all Resource Block Parameters, errors, and diagnostics are included. Also the modes, alarm detection, status handling, and troubleshooting are discussed.

Definition

The resource block defines the physical resources of the device. The resource block also handles functionality that is common across multiple blocks. The block has no linkable inputs or outputs and it performs memory diagnostics.

Parameters and Descriptions

The table below lists all of the configurable parameters of the Resource Block, including the descriptions and index numbers for each.

Parameter	Index Number	Description
ACK_OPTION	38	Selection of whether alarms associated with the function block will be automatically acknowledged.
ALARM_SUM	37	The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block.
ALERT_KEY	04	The identification number of the plant unit.
BLOCK_ALM	36	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status parameter. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
BLOCK_ERR	06	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
CONFIRM_TIME	33	The time between retries of alert reports.
CYCLE_SEL	20	Used to select the block execution method for this resource. The 2051 supports the following: Scheduled: Blocks are only executed based on the function block schedule. Block Execution: A block may be executed by linking to another blocks completion.
CYCLE_TYPE	19	Identifies the block execution methods available for this resource.
DD_RESOURCE	09	String identifying the tag of the resource which contains the Device Description for this resource.
DD_REV	13	Revision of the DD associated with the resource - used by an interface device to locate the DD file for the resource.
define_write_lock	60	Enumerated value describing the implementation of the WRITE_LOCK.
detailed_status	55	Indicates the state of the transmitter. See Resource Block detailed status codes.
DEV_REV	12	Manufacturer revision number associated with the resource - used by an interface device to locate the DD file for the resource.
DEV_TYPE	11	Manufacturer's model number associated with the resource - used by interface devices to locate the DD file for the resource.
download_mode	67	Gives access to the boot block code for over-the-wire downloads. 0 = Uninitialized 1 = Run mode 2 = Download mode
DRAIN_VENT_MAT	75	Type of material of the drain vents on the flange. See drain vent material codes. 2 = 316 Stainless Steel 3 = Hastelloy C™ 4 = Monel 251 = None 252 = "Unknown" 253 = "Special"
FEATURES	17	Used to shows supported resource block options.
FEATURES_SEL	18	Used to show selected resource block options. The 2051 supports the following: Unicode: Tells host to use unicode for string values Reports: Enables alarms. Must be set for alarming to work Software Lock: Software write locking enabled but not active. WRITE_LOCK must be set to activate. Hardware Lock: Hardware write locking enabled but not active. WRITE_LOCK follows the status of the security switch.
final_assembly_number	49	Final Assembly Number is placed on the neck label.

Parameter	Index Number	Description
FLANGE_MTL	69	Type of material of the flange. See flange material codes. 0 = Carbon Steel 2 = 316 Stainless Steel 3 = Hastelloy C™ 4 = Monel 24 = Kynar™ 252 = "Unknown" 253 = "Special"
FLANGE_TYPE	68	Type of flange that is attached to the device. 12 = Conventional (Traditional) 13 = Coplanar 14 = Remote Seal 15 = Level; 3 in. 150 lbs. 16 = Level; 4 in. 150 lbs. 17 = Level; 3 in. 300 lbs. 18 = Level; 4 in. 300 lbs. 19 = Level; DN 80, PN 40 20 = Level; DN 100, PN 40 21 = Level; DN 100, PN 10/16 22 = Level; 2 in. 150 lbs. 23 = Level; 2 in. 300 lbs. 24 = Level; DN 50, PN 6 25 = Level; DN 50, PN 40 252 = "Unknown" 253 = "Special"
FREE_TIME	25	Percent of the block processing time that is free to process additional blocks.
FREE_SPACE	24	Percent of memory available for further configuration. Zero in a preconfigured device.
GRANT_DENY	14	Options for controlling access of host computers and local control panels to operating, tuning, and alarm parameters of the block. Not used by device.
HARD_TYPES	15	The types of hardware available as channel numbers.
hardware_rev	52	Hardware revision of the hardware that has the resource block in it.
LIM_NOTIFY	32	Maximum number of unconfirmed alert notify messages allowed.
MANUFAC_ID	10	Manufacturer identification number – used by an interface device to locate the DD file for the resource.
MAX_NOTIFY	31	Maximum number of unconfirmed alert notify messages possible.
MEMORY_SIZE	22	Available configuration memory in the empty resource. To be checked before attempting a download.
message_date	57	Date associated with the MESSAGE_TEXT parameter.
message_text	58	Used to indicate changes made by the user to the device's installation, configuration, or calibration.
MIN_CYCLE_T	21	Time duration of the shortest cycle interval of which the resource is capable.
MODE_BLK	05	The actual, target, permitted, and normal modes of the block: Target: The mode to "go to" Actual: The mode the "block is currently in" Permitted: Allowed modes that target may take on Normal: Most common mode for actual
NV_CYCLE_T	23	Minimum time interval specified by the manufacturer for writing copies of NV parameters to non-volatile memory. Zero means it will never be automatically copied. At the end of NV_CYCLE_T, only those parameters which have changed need to be updated in NVRAM.
O_RING_MTL	69	Type of material of the flange o-rings. See O-ring material codes. 10 = PTFE (Teflon™) 11 = Viton 12 = Buna–N 13 = Ethyl–Prop 252 = "Unknown" 253 = "Special"
output_board_sn	53	Output board serial number.

Parameter	Index Number	Description
self_test	59	Instructs resource block to perform self-test. Tests are device specific.
distributor	42	Reserved for use as distributor ID. No Foundation enumerations defined at this time.
REM_SEAL_FILL	73	Type of fill fluid used in the remote seals. 2 = Silicone 3 = Syltherm 800 4 = Inert (Halocarbon) 5 = Glycerin and Water 6 = Propylene Glycol and Water 7 = Neobee M-20 251 = None 252 = "Unknown" 253 = "Special"
REM_SEAL_ISO_MAT	70	Type of material of the remote seal isolators. See remote seal number codes. 2 = 316L Stainless Steel 3 = Hastelloy C-276 5 = Tantalum 9 = Co-Cr-Ni 251 = None 252 = "Unknown" 253 = "Special"
REM_SEAL_NUM	71	Number of remote seals. 1 = One seal 2 = Two seals 251 = None 252 = "Unknown" 253 = "Special"
REM_SEAL_TYPE	66	Type of remote seals. 0 = Undefined 1 = Reserved 2 = CTW 3 = EFW (Expanded Flange Seal) 4 = PFW (Pancake) 5 = RFW (Flanged Remote) 6 = RTW (Threaded Remote) 7 = SCW 8 = SSW 9 = High Temperature 10 = FFW (Flanged Flush Surface) 11 = UCW 12 = TSW 251 = None 252 = "Unknown" 253 = "Special"
RESTART	16	Allows a manual restart to be initiated. Several degrees of restart are possible. They are the following: 1 Run – nominal state when not restarting 2 Restart resource – not used 3 Restart with defaults – set parameters to default values. See START_WITH_DEFAULTS below for which parameters are set. 4 Restart processor – does a warm start of CPU.
RS_STATE	07	State of the function block application state machine.
save_config_blocks	62	Number of EEPROM blocks that have been modified since last burn. This value will count down to zero when the configuration is saved.
save_config_now	61	Controls saving of configuration.
security_IO	65	Status of security jumper/switch.
SHED_RCas	26	Time duration at which to give up on computer writes to function block RCas locations. Shed from RCas shall never happen when SHED_ROUT = 0
SHED_ROUT	27	Time duration at which to give up on computer writes to function block ROut locations. Shed from ROut shall never happen when SHED_ROUT = 0

Parameter	Index Number	Description
Simulate_STATE	66	The state of the simulate jumper. 0 = Uninitialized 1 = Jumper/ switch off, simulation not allowed 2 = Jumper/ switch on, simulation not allowed (need to cycle jumper/ switch)
simulate_IO	64	Status of simulate jumper/switch.
RB_SFTWR_REV_ALL	51	The string will contain the following fields: Major rev: 1-3 characters, decimal number 0-255 Minor rev: 1-3 characters, decimal number 0-255 Build rev: 1-5 characters, decimal number 0-255 Time of build: 8 characters, xx:xx:xx, military time Day of week of build: 3 characters, Sun, Mon,... Month of build: 3 characters, Jan, Feb... Day of month of build: 1-2 characters, decimal number 1-31 Year of build: 4 characters, decimal Builder: 7 characters, login name of builder
RB_SFTWR_REV_BUILD	50	Build of software that the resource block was created with.
RB_SFTWR_REV_MAJOR	48	Major revision of software that the resource block was created with.
RB_SFTWR_REV_MINIOR	49	Minor revision of software that the resource block was created with.
start_with_defaults	63	0 = Uninitialized 1 = do not power-up with NV defaults 2 = power-up with default node address 3 = power-up with default pd_tag and node address 4 = power-up with default data for the entire communications stack (no application data)
STRATEGY	03	The strategy field can be used to identify grouping of blocks.
ST_REV	01	The revision level of the static data associated with the function block.
summary_status	56	An enumerated value of repair analysis.
TAG_DESC	02	The user description of the intended application of the block.
TEST_RW	08	Read/write test parameter - used only for conformance testing.
UPDATE_EVT	35	This alert is generated by any change to the static data.
WRITE_ALM	40	This alert is generated if the write lock parameter is cleared.
WRITE_LOCK	34	If set, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated.
WRITE_PRI	39	Priority of the alarm generated by clearing the write lock.

Block Errors

The table below lists conditions reported in the BLOCK_ERR parameter. Conditions in bold type are available. Conditions in italics are inactive for the Resource block and are given here only for your reference.

Condition Number	Condition Name and Description
0	Other
1	Block Configuration Error: A feature in FEATURES_SEL is set that is not supported by FEATURES or an execution cycle in CYCLE_SEL is set that is not supported by CYCLE_TYPE.
3	Simulate Active: This indicates that the simulation jumper is in place. This is not an indication that the I/O blocks are using simulated data.
4	<i>Local Override</i>
5	<i>Device Fault State Set</i>
6	<i>Device Needs Maintenance Soon</i>
7	<i>Input failure/process variable has bad status</i>
9	Memory Failure: A memory failure has occurred in FLASH, RAM, or EEROM memory
10	Lost Static Data: Static data that is stored in non-volatile memory has been lost.
11	Lost NV Data: Non-volatile data that is stored in non-volatile memory has been lost.
12	<i>Readback Check Failed</i>
13	<i>Device Needs Maintenance Now</i>
14	Power Up: The device was just powered-up.
15	Out of Service: The actual mode is out of service.

Diagnostics

In addition to the BLOCK_ERR parameters, more detailed information on the device status can be obtained via DETAILED_STATUS. Table 5.3 lists potential errors and possible corrective actions for the given values. The first step should always be to reset the transmitter, then if the error persists, try steps in Table 5.3. Start with the first corrective action, and then try the second.

Value	Description	Corrective Action
0x00000002	Sensor Transducer Error (Check TB_DETAILED_STATUS)	1. Restart processor 2. Send to service center
0x00000004	Manufacturing Block Integrity Error	1. Restart processor 2. Send to service center
0x00000008	HW/SW Incompatible	1. Restart processor 2. Send to service center
0x00000010	NV Integrity Error	1. Restart processor 2. Send to service center
0x00000040	ROM Integrity Error	1. Restart processor 2. Send to service center

Modes

The resource block supports two modes of operation as defined by the MODE_BLK parameter:

- **Automatic (Auto)** The block is processing its normal background memory checks.
- **Out of Service (OOS)** The block is not processing its tasks. When the resource block is in OOS, all blocks within the resource (device) are forced into OOS. The BLOCK_ERR parameter shows Out of Service. In this mode, you can make changes to all configurable parameters. The target mode of a block may be restricted to one or more of the supported modes.

Alarm Detection

A block alarm will be generated whenever the BLOCK_ERR has an error bit set. The types of block error for the resource block are defined above.

A write alarm is generated whenever the WRITE_LOCK parameter is cleared. The priority of the write alarm is set in the WRITE_PRI parameter:

Alarms are grouped into five levels of priority

Priority Number	Priority Description
0	Alarm is disabled.
1	Alarm is detected, but not sent as a report.
2	Alarm report is sent, but does not require operator attention.
3-7	Alarm conditions of priority 3 to 7 are advisory alarms of increasing priority.
8-15	Alarm conditions of priority 8 to 15 are critical alarms of increasing priority.

Status Handling

There are no status parameters associated with the resource block.

Troubleshooting

Refer to the table below to troubleshoot any problems that you encounter.

Symptom	Possible Causes	Corrective Action
Mode will not leave OOS	Target mode not set.	Set target mode to something other than OOS.
	Memory Failure	BLOCK_ERR will show the memory failure. Check RESTART value. Restart the device by setting RESTART to Processor. If the block error does not clear, call the factory.
Block Alarms Will not work	Features	FEATURES_SEL does not have Reports enabled. Enable the Reports bit.
	Notification	LIM_NOTIFY is not high enough. Set equal to MAX_NOTIFY.

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Rosemount 2051

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Emerson Process Management

Rosemount Inc.

8200 Market Boulevard
Chanhassen, MN 55317 USA
T 1-800-999-9307
Int'l 1-952-906-8888
F (952) 949-7001

www.rosemount.com



Emerson Process Management

Argelsrieder Feld 3
82234 Wessling
Germany
Tel 49 (8153) 9390
Fax 49 (8153) 939172

Emerson Process Management Asia Pacific Private Limited

1 Pandan Crescent
Singapore 128461
Tel (65) 777-8211
Fax (65) 777-0947
Enquiries@AP.EmersonProcess.com



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